DOCUMENT RESUME

ED 284 477 HE 020 554

AUTHOR	Wergin, Jon F.; And Others
TITLE	Assessing the Impact of Continuing Medical Education through Structured Physician Dialogue.
SPONS AGENCY	American Coll. of Cardiology, Bethesda, Md.
PUB DATE	[86]
NOTE	207p.
AVAILABLE FROM	American College of Cardiology, Heart House, 9111 Old Georgetown Road, Bethesda, MD 20814.
PUB TYPE	Reports - Descriptive (141) -- Reports - Research/Technical (143) -- Tests/Evaluation Instruments (160)
EDRS PRICE	MF01/PC09 Plus Postage.
DESCRIPTORS	Behavioral Objectives; Cardiovascular System; Diagnostic Tests; *Evaluation Methods; Heart Disorders; Higher Education; *Interviews; *Medical Services; *Physicians; Primary Health Care; *Professional Continuing Education; Professional Training; *Program Effectiveness
IDENTIFIERS	*American College of Cardiology

ABSTRACT

A method for evaluating physicians' practice behavior after undertaking continuing medical education (CME) conducted by the American College of Cardiology (ACC) was developed and tested during 1983-1985. The literature on CME effectiveness and physician behavior change was reviewed. Physicians who were trained interviewers conducted telephone interviews that incorporated behavioral objectives. Medical chart reviews were used to help validate interview data. The evaluation was based on interview data obtained from two groups: (1) 49 physicians (out of 80) who took a course on the use of echocardiography; and (2) 53 (out of 80) participants in a course on coronary patient rehabilitation. The practice behavior of physicians who did not attend the courses was also documented by interviews. The interview method was assessed using the criteria of accuracy, sensitivity, feasibility, and interpretability. In addition to findings about post-course physican practice behaviors and the value of the interview method, appended materials include: pre- and post-program interview protocols for both courses, results of chart surveys, case studies that describe behavioral changes (or no change) for attendees, and case studies that discuss practice behavior for physicians who did not attend the courses. (SW)

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Assessing the Impact of Continuing Medical Education Through Structured Physician Dialogue

Jon F. Wergin, Ph.D.
Paul E. Mazmanian, Ph.D.
William W. Miller, M.D.
Klara K. Papp, Ph.D.
W. Loren Williams, Ph.D.

Virginia Commonwealth University

The study reported here was supported by a grant from the Intermedics Endowment fund of the American College of Cardiology

ACKNOWLEDGMENTS

The research reported in this monograph has been long and complicated, and we have many people to thank. We want to acknowledge first the support of Mr. William Nelligan, Executive Vice President of the American College of Cardiology, without whom this project could never have been done. Ms. Barbara Kendrick, Director of the Learning Center, and her staff handled innumerable administrative details on top of an already heavy workload with skill, patience, and good humor. The Research in CME Committee, chaired by Dr. Marvin I. Dunn, was a source of guidance and support throughout the project. We want especially to thank the three consultants to this Committee, Drs. Roland Hiss, University of Michigan, Stuart Cohen, University of Indiana, and Jay Moskowitz, N.I.H. Their skill at blending encouragement with thoughtful criticism shaped the research significantly. Dr. Marcia Whitney of the University of Maryland served as ACC consultant to the project. Her role was much more than one of consultant, however. Her enthusiasm, wisdom, and insight was such that she became a valued and trusted colleague; and this report is in part hers.

We want to acknowledge three other groups of people as well. First are the six ACC-member cardiologists who served as project interviewers: Drs. Alston Blount, Jr., Lay Fox, Eric Kemp (now deceased), David Propert, Jack Segal, and Stanley Silverberg. As a group they conducted more than 300 telephone interviews during the project. Their interest, diligence, and collective contributions to the ACC and continuing medical education deserve recognition far beyond this brief acknowledgment. Second are the 137 physicians who participated so willingly in the study by giving their time for interviews and, in some cases, patient chart reviews. Finally, we want to thank publicly two long-suffering secretaries: Ms. Sandy Caldwell for maintaining bulging project files, managing the budget and typing early project reports; and Ms. Gail Brooks for producing the seemingly-endless versions of this final manuscript.

Jon F. Wergin
Paul J. Mazmanian
William W. Miller
Klara K. Papp
W. Loren Williams

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EXECUTIVE SUMMARY

In 1983 we contracted with the American College of Cardiology to develop and test a method for evaluating physicians' practice behavior as a result of their participation in CME programs conducted at the Heart House in Bethesda, Maryland. More than two dozen formal CME courses of several days' duration are offered at Heart House each year for primary care physicians and cardiologists from around the country. Our research objectives for the project were as follows:

1. To develop a method for assessing the impact of ACC programs on physician practice behavior, *using practicing cardiologists as trained interviewers;*
2. To test this method, using participants in two Heart House programs, one from 1983–84 and one from 1984–85; and
3. Based on the results of the studies, to determine: a) the validity and reliability of the method; b) the effectiveness of the selected programs on modifying or reinforcing physician behavior; and c) the feasibility of implementing the evaluation method on a larger scale, as a routine part of Heart House programming.

Study Design

The design of the study was based upon an exhaustive review of previous studies evaluating the effectiveness of CME programs. This review suggested that any method for evaluating CME effectiveness should meet four criteria:

1. *Accuracy:* depiction of the precise character of behavioral change, whether recorded or nonrecorded, expected or unexpected, major or subtle;
2. *Sensitivity:* documentation of both simple and complex effects, recognition of variables specific to practice contexts;
3. *Interpretability:* sufficient detail to allow for inferences to be drawn regarding the meaning of the results obtained;
4. *Feasibility:* straightforward development and implementation; low cost relative to the value of the information collected.

Our purpose in the study was to develop and test a method of evaluation that would satisfy the above criteria significantly better than conventional tests, questionnaires, or chart reviews. Our choice was a telephone interview conducted by a physician colleague. The choice was based on the logic that a *structured dialogue* between CME conference attendees and a trained physician interviewer having a technical familiarity with the knowledge, skills, and behavior assessed would be a potentially useful and powerful evaluation tool.

The original research design was in the form of a randomized experiment, diagrammed below:

	Group 1	*Group 2*	*Control*
Pre-program	Interview	No Interview	Interview
Post-program	Interview	Interview	Interview
	Chart review	Chart review	
	(50%)	(50%)	

Participants in the selected Heart House programs were to be randomly assigned to one of two experimental groups; in addition, a control group was to be drawn from program applicants who cancelled their registration. Physician

interviewers were to conduct telephone interviews with Group 1 and control group members within 30–60 days prior to the program, ascertaining the degree to which they *already followed* practice behavior patterns related to program objectives. Interviewers were then to conduct telephone interviews with all participants and controls 60–90 days after the program, ascertaining the degree to which they *now* followed these practice behaviors, and determining the factors which led to their adoption or non-adoption. Following the post-program interview, copies of patient charts were to be requested from 50% of program attendees.

Study procedures

Implementation of the study followed these steps in each project year.

1. A program suitable for assessment was selected, based upon such criteria as behavioral specificity, likely attendance, and timing. In 1983–84, the selected course was "The Role of Echocardiography in Clinical Decision Making"; in 1984–85, the selected course was "Rehabilitation of the Coronary Patient."
2. Project staff met with the course director and others to inventory anticipated outcome behaviors, and to select objectives for inclusion in the interview protocol.
3. The protocol itself was developed through an iterative process (at least 5 cycles) of draft, pilot test, and redraft.
4. Six physician interviewers, all ACC-member cardiologists, were recruited, and trained in the use of the protocol. (All six interviewers participated in both project years.)
5. Program registrants were recruited to the study by a letter from the ACC, followed by a phone call from a member of the project team.
6. Control group members were identified and recruited, from program cancellations in 1983–84, and from a contiguous Heart House course in 1984–85.
7. Pre-program interviews were carried out in 1983–84 with 50% of program attendees (randomly selected) and all control group members, and in 1984–85 with 100% of both attendees and controls.
8. Two members of the project team observed the Heart House course in Bethesda, noting course content and emphasis.
9. Sixty days after the course, post-program interviews were carried out on all attendees and controls.
10. Following the post program interview, selected attendees were asked to complete a brief chart review survey covering one of the behavioral objectives included in the interview protocol.
11. Interview data were analyzed according to reported behavioral change pre–post program and the reasons for such change, and the degree of convergence with chart review data. Case studies were written for each physician participant in the study.

Physician participation

In 1983–84, of 80 program attendees, complete interview data were obtained from 49, for a participation rate of 61%. Of 32 potential controls, complete data were obtained from 14 (44%). Complete chart data were obtained from 18 of 35 attendees (51%).

In 1984–85, participation rates were 53 of 80 attendees (80%), and 21 of 45 controls (47%). Completed chart data were obtained from 10 of 25 attendees (40%).

In neither project year were statistically significant differences observed between attendees and controls in proportion of ACC membership, specialty, or practice setting.

Findings

In 1983–84, the percentage of attendee physicians meeting one of the three objectives covered in the interview protocol increased from 22% pre-program to 43% post-program; no behavioral change was found in the other two objectives. No behavioral change was found in the control group. Reported changes generally reflected program content: the objective showing change was covered extensively during the course, while the others were given minimal emphasis. Responses to open-ended questions revealed a wide range of course impact: 53% of the attendees indicated specific changes in their practice behavior, compared to 7% of the controls. Approximately 75% congruence was found between reported change or lack thereof and change as recorded in patient charts.

In 1984–85, the percentage of course attendees achieving one of two protocol objectives increased from 55% to 75%; no corresponding increases were found in the control group. Overall, 60% of attendees indicated behavioral change in the area covered by the objective, compared to 24% of controls. All respondents, both attendees and controls, met the second objective as stated, both pre and post program. However, 38% of attendees indicated behavioral change in the topic covered by the objective, citing the Heart House course as a major influence. Overall, 74% of the attendees indicated practice change, compared to 29% of the controls. Of the ten chart surveys returned, only three contained the requisite number of patients for analysis, making the data difficult to interpret. Four of the ten attendees had reported changing the behavior in question, but in no case was the assertion confirmed by the chart survey data.

Assessment of the method

The interview method was examined critically, against the four criteria mentioned earlier.

Accuracy. Overall *reliability* of the interview protocol was assessed in both years using six "test cases." Test-retest consistency of the protocol was 66% and 70% for Years 1983–84 and 1984–85 respectively. An indepth analysis in Year 1984–85 revealed that about 40% of the observed "error" was traceable to differences in respondents' answers across independent administrations, owing largely to the open-ended protocol format, whereas about 45% was due to differences among interviewers in recording essentially similar responses. Three forms of *validity* were studied. "Face" validity, the extent to which the method was credible to interviewers and respondents, was found to be strong in both years. "Content" validity, defined as the extent to which the protocol reflected content most emphasized in the course, improved significantly in Year 1984–85. "Construct validity," particularly the issue of response error, proved to be more problematic. The chart review phase of the study had been intended as a partial check of response error by measuring

convergence between interview responses and chart data. But the logistical difficulties posed by chart reviews, plus the severe limitations of information contained in the charts, made the results inconclusive.

Sensitivity. The interview method's sensitivity to complex as well as simple effects was found to be its greatest strength. The interview data revealed an enormous range of CME impact, and identified several practice-specific variables that affect such impact.

Interpretability. Making the rich data base interpretable was difficult, as statistical summaries often seemed to destroy the context of individual answers. As the study progressed, case studies were increasingly used as an alternative organizing tool for uncovering reasons for behavioral change or lack thereof.

Feasibility. Early concerns relating to the feasibility of enlisting interviewers and respondents for the project proved groundless, although the amount of time required to reach respondents was heavy in some cases. Protocol development and analysis of data, while streamlined in 1984–85, still required a substantial professional investment.

Conclusions

While specific practice behavior changes were reported by a majority of attendees in both Heart House courses studied, and nearly all attendees reported specific impacts on knowledge or attitude as well, the study also demonstrated the enormous complexity of physician behavior change and the role of CME in fostering such change. Data from the study supported other CME research in several ways: that practice change is a continuous process; that CME is most effective when it interacts with other sources of influence, often local colleagues; and that clinical practice rarely changes immediately upon receipt of new information. The study also demonstrated, however, that traditional CME programs can have a significant impact on the behavior of practicing physicians, when two conditions are met: 1) when behavior change is defined to include adjustments and refinements in patient care, as well as major practice changes; and 2) when the opportunity exists for physicians to incorporate such modifications in their practices.

Four conclusions were drawn regarding the interview method used in the study: 1) telephone interviews are more sensitive to course-specific changes than other survey forms; 2) interviews are capable of collecting a great deal of information in as little as 10–15 minutes; 3) physician respondents are generally receptive to this approach; and 4) interviews are not as suitable for the collection of quantitative data as they are for measures of change in attitude, clinical decision criteria, behavioral intent, and qualitative perceptions of course impacts.

Finally, an alternative way of thinking about CME was suggested, based upon the research data and Ajzen and Fishbein's "theory of reasoned action." Five implications of the evolving theory for CME were drawn:

1. Examine the practice needs and contexts of physicians attending CME programs.
2. Directly measure physicians' intentions to change.
3. Study and document external factors which distinguish physicians who change from those who do not.
4. Measure beliefs and attitudes physicians hold about their own behavior change.
5. Measure physicians' perceptions of behavioral expectations held by course faculty, important colleagues, or patients.

INTRODUCTION

The primary mission of the American College of Cardiology is to ensure that those who treat cardiovascular disease have access to the rapidly-expanding knowledge in the field. The Heart House Learning Center is the site of many continuing medical education (CME) programs sponsored by the ACC, and is one of the most technologically-advanced facilities of its type. The major classroom contains 69 custom-designed chairs which are linked through a control room to the speaker's lectern; lecturers can interact with participants, display participants' answers on an electronic graph, and direct specific displays of information (charts, graphs, videotapes) to each of the seats through individual TV consoles mounted on the chairs. In addition, rear projection equipment can flash visual data on the classroom's screen. Besides the classroom, Heart House contains six small group conference rooms, each with projection equipment and closed-circuit television capability; self-study rooms; and a substantial resource library.

Heart House offers a curriculum of about two dozen courses per year. Each course typically lasts for three days, and is taught by a team of faculty nationally-known for their expertise in the subject matter. The scope of programs offered is broad, and attracts a wide variety of physicians and other health care professionals.

Courses are routinely evaluated by a brief participant survey covering such items as clarity of course objectives, value of information presented, and effectiveness of instructors. Open-ended questions allow for expansion of participants' answers.

Participant feedback on the post-course questionnaires provides useful information for program planning and modification. But a central question of interest was unanswered through this evaluation method, namely: how, if at all, does attendance at a Heart House course affect participants' actual practice behavior back home? The guiding assumption behind Heart House courses—and most other CME—is that physicians will use course information to make desirable practice changes. Clearly, many thousands of physicians have been recertified as specialists after passing written examinations based upon facts that did not exist when they graduated from medical school. But the problem is that a substantial body of research has shown that clinical knowledge does not often result in practice change, and when it does, the role of CME as a factor is often obscure. An additional concern is the enormous investment made in CME, both by providers such as the ACC, and by participants themselves. These concerns led the ACC to underwrite a two-year research project to investigate methods for evaluating physician behavior change as a result of participation in Heart House programs. To quote from the ACC's original request for proposals:

> There are a vast number of continuing education opportunities developed by medical schools, professional societies and private concerns. The programs often receive high praise from participants and many such programs have been shown to be effective in teaching new skills and increasing participant knowledge. There are, however, few studies evaluating the impact of continuing education on the practice of cardiovascular medicine. Little information is available as to whether physicians treating patients with cardiovascular disease alter diagnostic and management practices as a result of knowledge and skills gained through continuing education or other instructional programs; nor, is it known whether con-

tinuing education quickens the rate at which new innovations are entered and obsolete medical practices are removed from a physician's diagnostic and management armamentarium.

In 1983 the ACC Research in CME Committee awarded a two-year contract to the Center for Educational Development and Faculty Resources at Virginia Commonwealth University, to conduct an evaluation of the impact of two Learning Center programs on the practice habits of the physicians attending those programs. This monograph details the work of the VCU project team.

The monograph is organized as follows. In Chapter 1 we review the available research literature on CME effectiveness and physician behavior change, focusing particularly on what these studies suggest about ways in which CME impact may be most accurately and reliably measured. This discussion provides the basis for the current study's rationale and design, which is described in Chapter 2. In Chapters 3 and 4 we describe the procedures and findings of the project in each of the study years; in Chapter 5 we synthesize and interpret these results; and in Chapter 6 we offer several conclusions and implications for CME programming based upon our findings.

CHAPTER 1

Relevant Literature

Four comprehensive reviews of CME evaluation literature have been published in the past ten years. Bertram and Brooks-Bertram (1977), after reviewing 65 studies, found that less than 20% of the studies used true or quasi-experimental designs, and only 7% tested the reliability and validity of their measures. Fewer than 3% of the studies were able to demonstrate significant effects six weeks or more after the program. An assessment of the CME literature by Lloyd and Abrahamson (1979) examined 47 studies using "objective" methods of evaluation. Just under half were able to demonstrate some change in physician competence (impacts on knowledge or skill), but nearly half of these did not subject their results to statistical analysis. In the six studies considered "rigorous" by the authors (those having a modicum of experimental control), half showed significant CME impact. Lloyd and Abrahamson concluded that based on the sample of studies reviewed, the probability of finding significant effects was about .50, although they cautioned against generalization of these findings. Haynes, *et al.*, (1984) reviewed 248 CME studies dating back to the mid 1930's. As in the other reviews, the authors focused on the most "rigorously-designed" studies and those which assessed CME impact on physician behavior and patient outcomes. Only seven studies met their inclusion criteria, and while all seven reported statistically significant changes in physician performance, CME impacts tended to be modest and highly variable. Further, only three of the seven studies assessed patient outcomes, and only one found any improvement.

Raymond (1986) performed a statistical meta-analysis on 54 published studies of the effectiveness of continuing education for health professionals. He found statistical significance in just over half of the effectiveness criteria examined, a finding consistent with that of Lloyd and Abrahamson (1979). The mean effect size was .45, indicating that the mean of the education (treatment) groups was, on the average, nearly one-half a standard deviation above the mean of the control groups. Raymond also examined the relationship between program characteristics and program effectiveness, and found that duration of instruction was essentially unrelated to effect size and significance level, and that the impact of continuing education may depend, in part, on the care and attention directed toward program development. Raymond cautioned that the generalizability of his findings may be limited, unless one assumes that all health professions are equally needy in terms of their continued need for professional development.

Other more discipline-specific literature reviews of CME effectiveness, in surgery (Greenburg, *et al.*, 1977), family practice (Berg, 1979), and psychiatry (Cohen-Cole, 1980), all support the general conclusion that the effectiveness of formal CME programs has yet to be systematically demonstrated.

Studies of the effect of CME on physician behavior published within the last few years have done little to settle the issue. Both positive and negative findings have been published with approximately equal frequency. On the negative side, Pinkerton, *et al.* (1980), used a randomized experimental design to show that while a significant, long term impact on physician *knowledge* was achieved by the program, effects on physician *behavior* as measured by chart reviews were non-significant. Curry and Purkis (1982) found that despite certain "commitments to change" expressed by CME participants, no significant

behavior change occurred, again as measured by chart review.

In one of the most controversial studies, Sibley, *et al.* (1982) conducted an elaborate "randomized trial" of CME, randomly assigning eight family physicians each to "treatment" (learning packages) versus "no treatment" conditions, and comparing 4,500 episodes of care before and after intervention. Results indicated that while learning occurred as measured by objective tests, the packages themselves had little effect on auditable "quality of care." While such methodological concerns as the small sample size and the nature of the educational "treatment" limited the interpretability of the study findings, the authors called for a "re-evaluation" of the assumptions undergirding traditional CME programs.

Evans *et al.*, (1986) found through randomized trial that a mailed continuing education program alone had no significant impact on the behavior of physicians treating hypertensive patients. Although formal pretesting documented that the program led to significant improvements in physician knowledge over the short term, no lasting difference between the study and control group knowledge levels was maintained and no performance was significantly changed in the desired direction.

Several other studies of the effect of CME programs on physician behavior have shown positive results. For example, Klein, *et al.* (1981) discovered a statistically significant impact on hospital physicians' prescribing patterns, using a randomized controlled trial with a "physician tutorial" as the experimental variable. Johnson, *et al.* (1982) found similar effects of CME on hospital physicians' prescribing patterns. Jennett (1986) tested the effects of a continuing medical education program designed to alter the office management of hypertensive patients, and found significant behavior change compared with controls at six months on one objective, no change until twelve months on a second objective, and no change at all on a third objective. Avorn and Soumerai (1983) implemented an office-based physician education program to reduce the excessive use of three drug groups. Physicians who received personal education visits by clinical pharmacologists along with a series of mailed "unadvertisements" reduced significantly their prescribing of the target drugs when compared with controls ($p < .001$). No such change was seen in physicians who received mailed print materials only. White, *et al.* (1982) found small but significant improvements in patient care by community physicians six months after a CME program. While interpretation of the findings of the White, *et al.*, study are open to question due to design limitations, one of their corollary findings—large variations in impact from one community to another—may help explain why results from programs in *single* settings are so variable from one another. Recently, White, *et al.* (1985) conducted a randomized controlled trial to assess CME impact on physician care of patients with acute myocardial infarction, and found a significantly greater increase in desired care practices by physicians in the experimental group. Even so, 70% of the physicians in the target group did not change their practice behaviors as a result of the educational intervention.

To summarize: Taken as a whole, studies purporting to evaluate changes in physician behavior have generated inconsistent results. It is likely that the inconsistencies are due to one or more of the following factors: 1) differences in education and practice contexts; 2) the degree to which "hands-on" training is used; 3) variations in educational design quality; and 4) variations in the sensitivity and accuracy of evaluation tools. The medical chart review has tra-

ditionally been regarded as the *sine qua non* of practice behavior measurement. But observers are beginning to notice the severe limitations of this technique. Goldfinger (1982), for example, in a powerful response to the Sibley, *et al.*, study (1982), noted pointedly that "medical records reflect the quality of care variably and . . . often poorly" (p. 540). At most, chart reviews reflect only specific, recordable changes in a physician's practice. Strengthening of *already-practiced* behaviors may go unnoticed. Several studies have shown that a major reason for physician attendance at formal CME programs is *not* to change behavior, but rather to consolidate, validate, and obtain reinforcement for current practices (cf., Richards and Cohen, 1980; and Geyman and Gordon, 1982). It should come as no surprise, therefore, that evaluation designs relying principally on pre-post behavior changes via chart review have had such divergent results.

How, then, to accurately measure such a complex construct? The most straightforward way would be through systematic observation of sample physician behavior. Terry, *et al.* (1981), successfully employed a procedure using simulated patient visits, and found significant behavioral impacts of a course on chronic obstructive pulmonary disease for primary care physicians. But financial limitations of observational methods are obvious, particularly for a CME program targeted to physicians across the country. Further, the intrusion of an observer into a care-giving situation, whether actual or simulated, is bound to have a reactive effect on the behavior observed (Webb, *et al.*, 1981), and thus threaten the generalizability of any inferences drawn.

Taken together, these studies and experiences all point to the need for development of appropriately specific yet flexible measures of participant learning, and physician practice behavior as a function of that learning, to complement, perhaps even replace, chart reviews. Such measures have typically taken the form of followup questionnaires. Markert, *et al.* (1981), for example, developed and implemented a questionnaire to be completed 3–6 months following the program, asking the following questions: "Are you doing anything different in your practice as a function of this program? If yes, what changes have you made in diagnostic, treatment, or follow-up procedures? Please describe one example of that change." The authors reported a mean response rate of 39% to the questionnaire, and just over 60% of the respondents reported some change in their practice patterns. Ferguson, *et al.* (1984) reported a 60% response rate to a CME follow-up questionnaire, with 23% of respondents reporting behavioral change.

Purkis (1982) has developed a simple tool called "commitment for change." Participants at a CME symposium were asked to indicate up to three things they proposed to change in their practices. Two months later participants were advised of their earlier responses and asked how many of those changes had been implemented. One or more changes were noted by 93% of the respondents. Cauffman, *et al.*, (1985) reported similar findings. After each week of a 21-week review course, physicians were asked to indicate what changes they intended to make in patient management plans based upon the material presented. At the conclusion of the course a random sample of attendees was given a second questionnaire asking for up to two examples of practice changes they had already made. Of those responding, 88% reported "medically correct and appropriate" changes. These are startlingly high percentages, and raise the issue of whether questionnaires such as these may be vulnerable to "socially-desirable" responses (Edwards, 1957), particularly in

view of the considerably more modest results obtained from studies cited earlier.

Questionnaires have several other serious methodological problems, at least within the context of CME programs. First, written surveys tend to be limited to the collection of relatively superficial information and less sensitive to complex phenomena. The Market, *et al.* study (1981), for example, was able to report behavior change only in very general categories. As noted previously, the effects of CME tend to be considerably more subtle. Second, the response rate to mailed questionnaires is often quite low, usually under 50%, thus raising questions of response bias. And third, questionnaires offer no opportunity for probing or clarification, and thus—like chart reviews—may be insensitive to important outcomes.

The implications suggested by published CME evaluation research are clear. Traditional measures of CME effectiveness have been based on simplistic assumptions related to expectations of change and the most appropriate ways to document and explain such change. As Fox, *et al.*, (1984) suggest, there is a need for more information about how formal CME fits into the lives of physicians, so that the success and failures of contemporary CME might be better understood. When the objectives of CME programs are inconsistent with the actual role that CME plays in the lives of physicians who attend these programs, evaluation may show little or no effect. Research conducted by Geertsma, *et al.*, (1982) on how physicians change patient care practices is illuminating. The study identified three fundamental stages in the change process: 1) "priming," sensing dissatisfaction with some aspect of practice behavior; 2) "focusing," learning alternative behavior; and 3) "follow-up," obtaining further information regarding the possible change. The authors suggested that CME is the most effective in the focusing stage, and that follow-up is overridingly dependent on colleagues who represent an authoritative professional perspective.

The Geertsma, *et al.*, study has significant methodological implications for the evaluation of CME. Perhaps the most important of these is to suggest that other factors influencing practice change must be considered when attempting to isolate CME effects. In short, what is needed is a method that maximizes each of the following criteria:

1. *Accuracy:* depiction of the precise character of behavioral change, whether recorded or nonrecorded, expected or unexpected, major or subtle;
2. *Sensitivity:* documentation of both simple and complex effects, recognition of variables specific to practice contexts;
3. *Interpretability:* sufficient detail to allow for inferences to be drawn regarding the meaning of the results obtained;
4. *Feasibility:* straightforward development and implementation, low cost relative to the value of information collected.

These criteria guided development of the evaluation method described in this monograph.

CHAPTER 2

Project Rationale and Design

Our purpose in this study was to develop and test a method of evaluation that would satisty the criteria listed in Chapter 1—accuracy, sensitivity, interpretability, feasibility—better than conventional assessment strategies. Several early assumptions guided our thinking:

1. Physicians learn and adopt new behaviors in a variety of ways, only one of which is formal postgraduate education. Participation in CME is only one of an array of factors influencing practice change.

2. While the primary focus of the investigation would be to measure changes in patient care practices that are *directly traceable* to participation in Heart House programs, the method developed should also allow for two important secondary foci: documentation of factors accounting for behavioral impact or lack thereof, and measurement of behavioral changes not directly related to Heart House participation.

3. The assessment strategy should be adaptable both to the scope of Heart House programs, which draw physicians from all over the United States and several foreign countries, and to the great diversity of physician specialties and practice patterns represented.

Together, these assumptions posed a methodological dilemma. How could a measure be developed that was sensitive enough to the complexity and diversity of medical practice, yet flexible enough to collect information from physicians all over the country? The most direct and straightforward measure of physician behavior is observation, and several studies using simulated patients have demonstrated the reliability of this method (see Chapter 1). But such an approach would obviously not be feasible for a national sample, in which subjects are separated by hundreds or thousands of miles. In contrast, evaluation based upon a written survey, while economically feasible, would be insufficiently sensitive to the level of detail required to capture important nuances and subtleties of practice change. A method that would accomplish both purposes was needed. In the course of our deliberations one of us asked, "If I were the director of a Heart House course, what would be the best way for me to determine whether attendees were doing anything differently?" The immediate, flippant response was, "I'd call them and ask them." But from this simple premise emerged the principal method for our research. We hypothesized that a telephone interview in the form of a structured dialogue between course attendees and a physician interviewer would be a potentially useful and powerful evaluation tool. We felt that using physicians as interviewers would be important for two reasons. First, only physicians would have the technical familiarity with the knowledge, skills, and behavior assessed—a crucial skill for probing and clarification of responses. Second, a physician interviewer—particularly an ACC member—would give the study credibility with attendee physicians, and this would heighten the chances of their participation.

The interview method has gained wide acceptance in evaluation research (cf., Weiss, 1975), primarily because of certain distinct advantages it has over mailed questionnaires (Berdie and Anderson, 1974): response rates are higher, it is more personal, and most important, it offers opportunities for probing and clarification of answers that are impossible in written surveys. Further, interviews are commonly used for needs assessment and program planning

purposes in CME (Mazmanian and Mazmanian, 1981). Most interviews are administered in a face-to-face format (Weiss, 1975), and hence their major disadvantage relates to their high cost. Use of the telephone has been proposed as a cost-saving format (cf., Dillman, 1978), and telephone procedures have been shown to be only one half to one third as expensive as face-to-face methods (Sudman, 1981). The utility of telephone interviews as a technique for collecting valid and useful data has been demonstrated in a variety of contexts. In a review of telephone survey methods, Sudman (1981) concluded that on balance, "response differences between phone and face-to-face procedures are small and can be ignored for most research applications" (p. 8). Further, there is some evidence to suggest that telephone surveys may actually elicit fewer socially-desirable responses than face-to-face procedures. Columbotos (1969) compared the two methods using a sample of practicing physicians, and his findings are enlightening. When interviewed face-to-face, almost twice as many physicians claimed to read six or more medical journals regularly, and 15% more claimed to have had three or more articles published in a medical journal, when compared to an equivalent group interviewed by phone. Thus, telephone methods may not only be more flexible and cost-effective than personal interviews, they may also be more accurate. A limitation of telephone surveys is that respondents tend to give more concise answers over the phone than they do in face-to-face encounters (Groves and Kahn, 1979), which implies that any telephone interview protocol must incorporate reasonably detailed procedures for response probing when necessary. This, of course, reinforces the need for credible, competent interviewers.

The use of telephone interviews as a procedure for evaluating programs in continuing medical education is infrequent. For example, the comprehensive review of evaluation research in CME by Bertram and Brooks-Bertram (1977) analyzed 65 studies reported in the literature between 1960 and 1977. Of these, only five used telephone surveys at all, and of these, four employed the approach strictly to document program attendance. The fifth study, reported by Kern, *et al.* (1968), used a semi-structured telephone interview to assess changes due to training programs in psychiatry. A search of the literature since 1977 did not unearth any more examples.

Since telephone surveys of physicians are done so infrequently, we wondered whether interviewing physicians within the context of a CME program would pose unique problems. Two studies, one reported by Manning and Denson (1979) and the other by Means (1979), were enlightening and mildly encouraging. In the former study, the authors surveyed a large sample of cardiologists (n = 289) by telephone in the Southern California area, ascertaining how they learned about echocardiography. Respondents were asked a series of questions relating to the source(s) of information and training in the technique, and level of use of the method. While the overall response rate to the survey was rather modest at 55%, the authors claimed that most of the problems with nonresponders revolved around problems of location (difficulty setting appointments, new phone numbers, no longer in the area, etc.). Less than 2% of the potential respondents actually declined to participate. Means (1979) conducted an investigation to determine the sources of information physicians use in acquiring information, what factors influence their selection, and the pattern with which such sources were used. About 30% of the survey respondents volunteered to be interviewed by telephone, and of these 90% were successfully contacted.

Both the Manning and Denson and the Means studies surveyed general

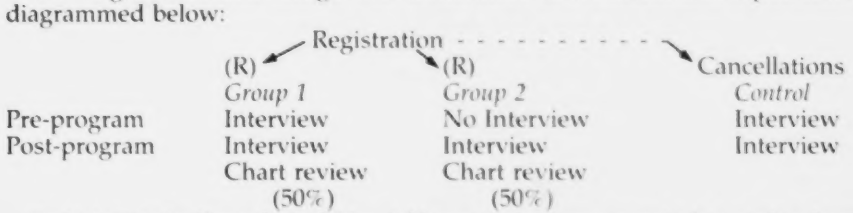
populations of physicians; our research, on the other hand, was to be undertaken with participants in a selected ACC program. Our expectation therefore was that participant responsiveness would be enhanced by clearly communicating the purpose of the study, and by making advance arrangements for the interview.

Project Design

Our research had three objectives:

1. to develop a method for assessing the impact of Heart House programs on physician practice behavior, using physicians as trained interviewers;
2. to test this method, using participants in two Heart House programs selected for representativeness, one from the 1983–84 curriculum year and one from the 1984–85 year; and
3. based on the results of the studies, to determine: a) the validity and reliability of the method; b) the effectiveness of the selected programs on modifying or reinforcing physician behavior; and c) the feasibility of implementing the evaluation method on a larger scale, as a routine part of Heart House programming.

The original research design was in the form of a randomized experiment, diagrammed below:



Participants in the selected Heart House programs were to be randomly assigned to one of two experimental groups; in addition, a control group was to be drawn from program applicants who cancelled their registration. Physician interviewers were to conduct telephone interviews with Group 1 and control group members within 30–60 days prior to the program, ascertaining the degree to which they *already followed* practice behavior patterns related to program objectives. Interviewers were then to conduct telephone interviews with all participants and controls 60–90 days after the program, ascertaining the degree to which they *now* followed these practice behaviors, and determining the factors which led to their adoption or non-adoption.

Primarily for the purpose of documenting the existence of reported (and recordable) physician behaviors, the study design also used medical chart reviews. As indicated in Chapter 1, chart reviews have severe limitations as evaluation tools, particularly relating to their accuracy and sensitivity as measures of certain outcomes. Still, we felt that when used as an adjunct technique, chart reviews would help establish the validity of the interview data. Following the post-program interview, copies of patient charts were to be requested from 50% of program attendees.

The above design would allow for answers to the following questions:

1. What changes were found in patient care practices? (Group 1, pre versus post)
2. To what extent does participation in a Heart House program account for changes in physician practice behavior? (attendees versus controls)

3. What is the congruence between reported and recorded behavior? (interview versus chart review data)
4. To what extent does a "pre" interview influence a "post" interview? (Group 1 versus Group 2)

The design also allowed for estimates of the following:

Interview accuracy. Besides completing the interview protocol, the interviewer completed a summary sheet immediately following the interview. A copy of the sheet was mailed to the respondent, who was asked to respond to the accuracy of the summary. In addition, a group of six "test case" physicians was recruited to provide a quantitative reliability estimate for the protocol. These procedures are described more fully in Chapter 3.

Interview validity. Half of the participants were asked to provide information from patient charts following the post-program interview. The following assumptions led us to incorporate a chart review phase:

A. Physician behaviors concerning patient care can be divided into two domains: those that occur and are recorded in patient charts, and those that occur and are *not* recorded in patient charts.

B. Heart House programs influence behaviors in both domains to some extent. Some behaviors may be strengthened, others may be weakened, some may be changed altogether.

C. Physicians are likely to remember which behaviors were affected as a consequence of their participation in the Heart House course and are likely to describe them to a colleague at the time of the interview.

Patient charts were expected to confirm the interview findings relative to physician behaviors *recordable* in patient charts. A finding that recorded behaviors confirmed the data obtained during the interview would strengthen the assumption that behaviors *not* recordable were reported accurately as well. In short, the findings obtained from the first domain could be generalized to the second domain.

Overall evaluation of program impact would be based on the number of participants changing behaviors according to each of the prespecified program objectives contained in the interview protocol. We also anticipated, however, that we would rely heavily on more qualitative data obtained during the interviews to document or suggest reasons for reported change or no change —and expected that these qualitative data would provide the bulk of important insights gleaned from the research.

Chapter 3

Study Procedures and Results—1983–84

This chapter and the one following both have three parts: study procedures, study findings, and data relevant to the method's reliability and validity.

Procedure

Selection of program and course objectives. In July of 1983 we met with American College of Cardiology (ACC) staff to select a program most suitable for assessment in the project's first year. Four criteria were used in this review: likely behavioral specificity of program outcomes, probability of program oversubscription and/or cancellations (for the control group), perceived receptivity to the project by the course director, and program timing (i.e., between December 1983 and March 1984). Given these criteria, the consensus choice was "The Role of Echocardiography in Clinical Decision Making," to be offered February 4–6, 1984. We then met with the course director to inventory anticipated outcome behaviors, on a topic-by-topic basis. Notes were converted after the meeting into a categorized list of 72 behavioral objectives, which was shared with the course director for his review and comment. Based on his feedback, the list of objectives was winnowed to 29, and changes in wording were made. The objectives were then cast into a "program objectives survey" for the course director and his four program faculty members. Each was asked to check each statement for accuracy, rate it for importance on a scale of 1–5, and estimate the number of patients a practicing cardiologist would likely see with the condition associated with that objective during a two month interval. All program faculty responded to the survey. Responses were compiled by project staff and discussed with the course director by phone. Based on three criteria—importance, opportunity (number of patients seen), and likelihood of pre-post behavioral change—three objectives were selected for inclusion in the interview protocol. (We felt that three specific conditions, plus some general questions, could be adequately discussed in a 20-minute telephone interview.) These objectives were:

1. To obtain an echocardiogram during the first several days of hospitalization for patients with acute myocardial infarction, for the purpose of assessing wall motion abnormalities;
2. To reduce the routine use of echocardiography for the purpose of locating possible source of embolus for stroke patients;
3. To reduce the use of echo for patients with ventricular arrhythmia uncomplicated by other conditions.

As implied in the above objectives, the overall goal of the course was not to train specialists in the use of echocardiography, but rather to help cardiologists and primary care physicians become more judicious in its use. During the objectives selection process, the course director clarified his general position on expected behavioral outcomes, stating that change in echo ordering *frequency* for the above conditions was less important than change in the *reasons* (i.e., clinical indications) for echo ordering. This position guided the staff during the development of the specific interview protocol.

Recruitment of physician interviewers. Given an estimated participant sample of 60, we decided that a group of six physician interviewers would be small

enough to be a manageable size, yet large enough to make the shared workload tolerable. Each interviewer was to be paid $150 for each completed interview. Six of the first seven cardiologists initially approached for participation agreed to serve. Three were from the Washington, D.C., area, two from Richmond, and one from Norfolk, Virginia. All were practicing cardiologists, and ACC members.

Development of interview protocol. The strategy used in developing the protocol was to ascertain, first, the number of patients seen with each of the three conditions (myocardial infarction, stroke, and arrhythmia), then to determine the number of echos ordered for these patients, then to inventory the clinical indications used as criteria for ordering and not ordering, and finally to ascertain the sources of information for those criteria. These questions were to form the basis for both the pre- and post-program interview; in addition, the latter protocol would contain questions relating to the Heart House course itself. The protocol form went through numerous drafts and revisions. Each later draft was pilot-tested by the cardiologist member of the research team, who telephoned a local cardiologist, conducted the interview, and recorded the responses on tape, along with the interviewee's critique of the protocol. We then used the tape to refine the instrument. One of the project interviewers assisted with the pilot testing, and served as an additional content expert. In all, the protocol was refined through eight successive drafts and five pilot tests (each with a different interviewee). The final versions of the pre- and post-program interview protocols are displayed in Appendices A and B respectively. The order of the three objectives was systematically varied so that each condition was examined first, second, and last one-third of the time.

Interviewer training. All six project interviewers agreed to meet at Heart House in early January, 1984, for a training session on the use of the protocols. Prior to the session, all interviewers were provided with background information on the project (including the research plan from the original proposal) and an overview of their responsibilities. The meeting was attended by all six interviewers, all five project staff, and an ACC staff consultant. The first part of the day was spent discussing the history, rationale, and experimental design of the project, and summarizing the Heart House course. Interviewers were introduced to the protocol by listening to a demonstration tape. We then led participants in a discussion and critique of the interview, interspersing the discussion with information on telephone interviewing techniques (summarizing, probing, etc.). Interviewers then divided into preassigned pairs for a practice session. Each pair was joined by a project staff member who served as observer and consultant. A physical barrier was placed between the pair to eliminate visual contact. Each member of the pair successively interviewed the other, following the protocol. At two points during each interview, and again at the end, the interview was halted for feedback from the interviewee and the consultant. After each member of the pair had had a chance to interview the other, the total group reconvened to debrief the practice session, inventory problems experienced, and suggest protocol revisions. Another practice session was held after lunch, with different pairings and consultants, but following a format similar to the morning session. During the second group debrief, final decisions were made as to changes in the protocol format and wording. (All changes are reflected in the protocol forms provided with this report.) The day ended with brief dis-

cussions of procedures for collecting and analyzing data, and administrative details.

Recruitment of program registrants. We drafted a letter to be sent to all program registrants, co-signed by the course director and the chairman of the ACC Research in CME Committee, requesting their participation in the study. In an effort to hasten response, a follow-up letter was sent to all registrants followed by a telephone call from a project staff member to non-respondents. A letter was also sent to those who cancelled their registration, requesting their participation in the control group. All participants were asked to indicate the day of week and time of day most convenient for an interview. Of 80 eventual course attendees, 66 were contacted for participation in the study, and 64 agreed to be interviewed. (The 14 physicians not contacted had registered too late.) Of 32 program cancellations, 21 were contacted for participation in the control group, and 19 agreed to be interviewed.

Pre-program interviews. Immediately upon obtaining the consent of those participants in the pre-post and control conditions, we assigned the case to one of the six physician interviewers. The top part of the protocol was completed with the respondent's name, phone number, and availability, and mailed to the assigned interviewer. All interviewers were provided with a charge number to be used for telephone contacts. Interview assignments also included the six test cases for a reliability analysis; since their identities *as* test cases were withheld from the interviewers, they were treated in exactly the same way as program participants. Pre-program interviews began the first week in February, 1984, and continued until the first week in March 1984. Interviews were completed with all members of the control group, and all but three members of the pre-post experimental group. Individuals not interviewed had all registered too late for an interview to be scheduled and carried out. Upon completion of the interview, the interviewer completed a summary sheet at the end of the protocol, made a copy of the protocol, and mailed the original back. Protocols were then turned over to two consulting medical records technologists, who coded all clinical responses using the ICD-9 classification.

Observation of the Heart House Course. Two project team members attended the Heart House program in early March, 1984, primarily for the purpose of observing and recording the subject matter covered and areas of emphasis. As a result of attending the program two important observations were made. First, the composition of conference attendees was not what the course director or his faculty had anticipated. As noted earlier, the program was meant to attract non-specialists, and to focus on decision making skills for referral. Instead, attendees as a group tended to be considerably more sophisticated: more than 90% indicated they *already* used echocardiography themselves or intended to learn the technique in the near future. As a result, the course emphasis was changed somewhat to meet the needs of these participants: less of an emphasis on criteria *for ordering* echos, more of an emphasis on *interpretation* of the test. Second, of the three objectives contained in the protocol, only the first dealing with myocardial infarction was covered specifically and in depth. The objective on stroke was covered directly for only a few minutes, and the objective on ventricular arrhythmia was only referred to tangentially during discussions of other topics.

Implementation of post-program interviews. The research design called for all participants and controls to be interviewed 60–90 days after the program. Pro-

tocols were prepared and mailed in late April to their assigned interviewers, with name, phone number, and availability filled in at the top. The interviewing physician again was randomly assigned, but different for all those who had been interviewed before. Post-program interviews began the second week of May, 1984, and were to end by the end of the month. However, just as in the pre-program phase, the interviewers faced significant scheduling problems: some respondents were difficult to contact, others cancelled or changed appointments frequently, and six physicians refused to be interviewed at all. As a result, post-program interviews extended well past the May 31 deadline. A detailed breakdown of physician participation in all stages of the interview process is provided below:

	Program Registrants (80)		Cancellations (32)
	Pre-post	Post only	
Contacted by letter	36	41	23
Follow-up contact	33	33	21
Agreed to interview	31	33	19
Interviewed—pre	27	—	19
Interviewed—post	23	26	14

Data coding and filing procedures were the same as in the pre-interview phase.

Organization of data. Reduction and summary of the interview data posed some unique problems. In order to exploit the advantages of physician-to-physician dialogue, and to minimize the risk of asking "leading" questions, most of the protocol was deliberately constructed in an open-ended fashion. As a result, responses often did not fall into neat, predefined categories. We were faced with the prospect of constructing *post hoc* categories based upon observed response patterns. The task proved most difficult with "clinical indications" questions. The cardiologist member of the team helped organize responses first into general clinical areas, based upon the codes assigned by the medical records consultants to the project. But just as the interviewers later observed, physician practices proved to be so varied and diverse that even this reduction produced an unwieldy large number of categories. Another problem was an occasional lack of clear delineation *between* categories: for example, a respondent who mentioned using echo for MI patients to "identify location of infarction" may have been giving essentially the same response as another who wanted to "assess wall motion abnormalities," even though these responses had been classified differently for purposes of analysis. At this point clarification was sought from the course director. He was provided with an exhaustive list of responses for each questions, and asked to indicate which he considered "appropriate" and "inappropriate." (Both pre-program and post-program responses were included in the same list, but were not identified as such.) The course director's feedback was then used to reconstruct the responses into smaller, mutually-exclusive categories. Finally, it was clear that even the most careful cross sectional analysis limited the contextual meaning of the interview responses: i.e., the full range of the program's impact (or lack thereof) on individual physicians could only be appreciated by studying the entire interview as a whole. Thus we decided to construct individual case studies of all respondents, summarizing and contrasting their use of echo before and after the Heart House course. These summaries are provided in full in Appendix C, and complement the tabulation of results which follow.

First-year Findings

Results of the 1984–85 project year are organized under the following headings:

A. Characteristics of participants and interviews;
B. Pre-post responses: overall use of echocardiography;
C. Objective 1: Use of echo for myocardial infarction;
D. Objective 2: Use of echo for stroke;
E. Objective 3: Use of echo for ventricular arrhythmia;
F. Sources of information for use of echo;
G. Identified impacts of the Heart House program on physician practice behaviors, knowledge and attitudes;
H. Case studies.

A. *Characteristics of participants and interviews*

Participants. Both attendee and control groups consisted largely of ACC-member cardiologists, as Table 1 indicates:

Table 1

Characteristics, Attendees vs. Controls

	ACC MEMBER? YES	NO	
Attendees	32	17	49
Controls	10	4	14
	42	21	63

$\chi^2 = .40$; NS

	SPECIALTY Cardiology	Internal Med./ Cardiology	Internal Med. & Other	
Attendees	25	14	10	49
Controls	10	2	2	14
	35	16	12	63

$\chi^2 = 1.49$; NS

Approximately two-thirds of attendees participating in the research study were members of the ACC, and four out of five indicated cardiology as a specialty area. Similar distributions were found for members of the control group (those who registered for the program but did not attend). No statistically significant difference between attendees and controls was found in either distribution, and thus the two groups may be considered roughly equivalent in these respects.

Interviews. We had predicted that the pre-program interviews would take between 15 and 20 minutes to complete on the average, while the post-program interviews would take approximately 5 to 10 minutes longer (due to the additional questions specifically related to the program). These expectations were, by and large, confirmed, as Table 2 indicates.

Table 2

Interview Length
Range and Mean
Pre and Post Program

	Length (in minutes)	
Interview	*Range*	*Mean*
Pre-program	10–34	21.9
Post-program (attendees)	10–36	24.6
Post-program (controls)	14–30	20.3

A few interviews were very short, and a few lasted more than a half hour, but most clustered around 20–25 minutes range. Post-program interviews with attendees, as expected, were a few minutes longer.

The first pre-program interviews took place during the last week of January, 1984, and continued through the first week of March. Most (66%) were concentrated, however, during the 10-day interval between February 7–17. Post-program interviews began during the second week of May (two months after the Heart House course) and continued through the first week of July, 1984. Most of these (55%) occurred between May 15 and May 25. For study participants having both pre and post interviews, the length of time between interviews is shown in Table 3.

Table 3

Time Interval Between
Pre and Post Interview
(in days)

	Range	*Mean*
Attendees	84–141	108
Controls	81–125	98

The shortest time interval was slightly less than 3 months; the longest was approximately 4½ months.

B. *Pre-post responses: overall use of echocardiography*

The first question on both the pre- and post-program interview protocol was, "For which kinds of patients do you find echo most useful?" This question served both to assess overall usage patterns and to put respondents at ease.

Among attendees, conditions mentioned by more than half of the respondents in the pre-program interview were valve disease, pericardial disease, and myocardial function, respectively; a similar pattern was evident in the post-program interview, except that coronary artery disease (including myocardial infarction) was mentioned relatively more frequently. Control physicians had similar responses: valve disease, pericardial disease, cardiomyopathy, and myocardial function were mentioned most frequently in the pre-interview, while all but cardiomyopathy were mentioned most frequently in the post-interview. Both attendees and controls gave fewer responses in the post-program interview, due to reduced interviewer probing and "warm-up." Interpretations of these data are therefore limited to a rough index of conditions for which echocardiography comes immediately to mind. With the

possible exception of coronary artery disease, evidence of program impact was slight.

The following three sections describe the findings related to the three pre-specified program objectives: use of echocardiography for patients with suspected acute myocardial infarction, stroke, and ventricular arrhythmia.

C. *Objective 1: Obtain an echocardiogram during the first several days of hospitalization for patients with suspected acute MI, to assess wall motion abnormalities.*

1. *Coverage.*

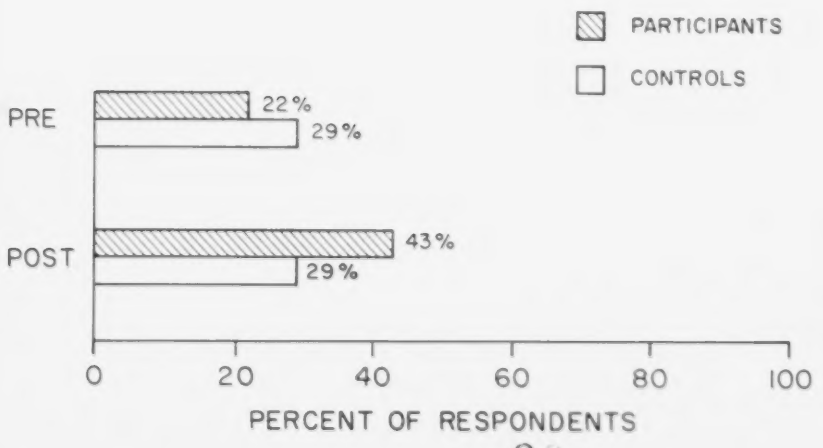
This topic was addressed in depth by the course director during the second morning of the course. He used numerous examples, showed several 2-D echos of MI patients to reinforce his points, and stressed the value of echocardiography as a means of visualizing the location and severity of infarction.

2. *Physicians at criterion, pre and post program.*

Physicians were judged to be "at criterion" if they routinely obtained an echocardiogram on patients suspected of having an acute myocardial infarction within the first several days of hospitalization, *regardless* of whether they suspected complications. The major point stressed during the course was that the procedure is useful to assess the extent of possible damage and possible wall motion abnormalities, even for otherwise "uncomplicated" cases.

Figure 1 shows the percentage of pre-post attendees and controls meeting this objective, both before and after the course. Pre-program, 22% of pre-post attendees were at criterion, compared to 29% of the controls; post-program 43% were at criterion, compared to 29% of the controls.

Figure 1
PERCENT OF RESPONDENTS MEETING OBJECTIVE 1 (1984): Routine Use of Echocardiography for Suspected MI Patients



In Table 4 the significance of pre-post change is tested separately for pre-post attendees and controls.

Table 4

Physicians at Criterion
Pre vs. Post Program:
Objective 1

ATTENDEES

		Post Program: Not at Criterion	Post Program: At Criterion	Total
Pre	Not at Criterion	13	5	18
Program	At Criterion	0	5	5
	Total	13	10	23

$\chi^{2*} = 3.20$; NS

CONTROLS

		Post Program: Not at Criterion	Post Program: At Criterion	Total
Pre	Not at Criterion	10	0	10
Program	At Criterion	0	4	4
	Total	10	4	14

(Statistic incalculable)

Among attendee physicians, five changed from non-criterion to criterion performance between the pre and the post interview. As a group, the change was not statistically significant. No control group members changed.

The group of 18 pre-post attendee physicians who did not meet the criterion pre-program is worth examining in some detail. Specifically, why did five of them apparently shift in the desired direction by the time of the post-program interview, while thirteen did not? Table 5 briefly profiles each of these physicians.

*The statistic used in this and other two-way tables with correlated samples is McNemar's Test of Change, with correction for continuity (McNemar, 1969).

Table 5

Attendee Profiles: not at criterion
pre-program

Change to criterion

Change(s)	*Reason(s)*
Increased use from 55% to 100%	Had become interested in echo as diagnostic tool, then attended Heart House course and 1 other; both convinced him that echo was useful, and now he uses it extensively.
Increased use from "infrequently" to 100%, when 2-D unit became available	Recognized potential for evaluating wall motion abnormalities.
Increased use from "infrequently" ("does not add to other tests") to routine when equipment available	Recognized use for evaluating wall motion and possible thrombi.
Increased use from 1% to essentially routine	Obtained 2-D equipment; course influence.
Increased use from infrequently" to routine	Evaluation of wall motion; greater use of IV Streptokinase.

No Change to Criterion

Factors

An experienced echocardiographer, in charge of hospital's noninvasive lab. Increased use of echo from less than 10% to 65%. Uses echo routinely after Streptokinase or if complications, but not for "uncomplicated clear-cut MI."

Small number of patients seen; more inclined to use in assessment of ventricular function, but still would not use for "uncomplicated infarcts."

Increased use slightly, to 80% of patients, but does not use for totally uncomplicated cases.

Increased use from "rarely" to 50%, primarily to evaluate left ventricular function, but only in complicated cases.

Increased use from "rarely" to 50%, primarily to evaluate left ventricular function, but only in complicated cases.

Increased use from 40% to 75%, but does not use for "uncomplicated, clear-cut MI."

Increased from "rarely" to about 1/3 of MI patients, those with complications; hospital recently acquired 2-D; intends to further increase use as a screening tool.

Increased from "rarely" ("not ordinarily necessary") to about 50% of cases to evaluate LV function, but only with complications.

Uses only for serious complications, "too expensive" otherwise; but intends to order more echos in the future to evaluate MI.

Uses for about 70% of MI patients, those with complications, but intends to increase to "almost all."

Uses echo only rarely for serious complications; does not feel it is helpful otherwise; but plans to obtain 2-D capability.

Has no portable 2-D unit in hospital; nuclear studies more commonly used.

Uses echo for about 1/3 of MI patients; finds bedside MUGA more helpful for others.

Uses only for serious complications; otherwise delays study for "more appropriate times."

Practice patterns of physicians who changed to criterion performance are clear: all now employ echo routinely for MI patients to assess wall motion, and all cited the Heart House course as at least one source of influence for the change. For one physician the change was principally due to recent acquisition of 2-D equipment, while another cited greater use of echo following Streptokinase.

More illuminating perhaps is the analysis of those 13 physicians who did not change according to strict definitions of the criterion. Seven did report change in the desired direction, but stopped short of using echo routinely to include uncomplicated cases. Two others stated an *intention* to use echo more frequently. Of the remaining four physicians, one expressed an interest to obtain 2-D capability, and two rely heavily on nuclear studies in place of echo.

3. *Frequency of use: pre-post course*

The previous section has implied that the use of echo for MI patients increased somewhat between the first and second interviews, even though the increase was not large enough to meet the criterion in some areas. Specific data on reported frequency of use are given below.

a. *Echos ordered/patients seen.* Question 2 in the protocol asked, first, for the number of patients with MI seen by the respondent during the preceding two months, and second, for the number of those patients for whom an echo was or would have been ordered.* Reported echo-ordering percentages are given in Table 6, for pre-post attendees and controls.

*Question 3 in the protocol asked whether any circumstances *other than clinical indications* affected the number of echos ordered. When that question was answered in the affirmative (about 20% of the time), respondents were asked how many they *would have* ordered. That response was then used in the analysis. Most often, "other circumstances" reflected availability of echo equipment.

Table 6

Percentages: echos ordered of MI patients seen

	Pre-program		Post-program	
	Mean %	Standard deviation	Mean %	Standard deviation
Pre-post attendees	39.1	32.8	52.6	35.2
Controls	37.4	31.3	30.2	34.9

t(difference in change scores) = 1.78; NS

Attendees and controls reported approximately equal percentages of echos/MI pre-program. Post program, attendee percentages increased to more than half of the patients seen, while the control percentage declined slightly. A t-test, calculated as a comparison of change scores, did not reach statistical significance. This may be explained in part by the large standard deviations in both groups, which signifies the great diversity in practice patterns, both pre- and post-program.

b. *Reported change*. Question 12a in the post-program protocol asked, "Is the frequency with which you order echocardiograms different now from what it was in February, *or not*, for patients with suspected acute myocardial infarction?" As Table 7 indicates, nearly half of all course attendees reported ordering echos more frequently, while there was no corresponding change in the control groups:

Table 7

	Reported Change in Echo Ordering for MI			
	No change	Order more	Order fewer	TOTAL
Attendees	25	23	1	49
Controls	14	0	0	14

$\chi^2 = 10.00$; $p < .01$

The reported change is in the expected direction and is statistically significant.

To assess whether attendees who had had a pre-program interview were "sensitized" to the topic by that interview, and thus more likely to report change, they were compared to post-only attendees (Table 8). No significant difference was found.

Table 8

Reported change in Echo
Pre-Post vs. Post-only attendees

	No change	Order more	Order fewer	TOTAL
Pre-post	12	11	0	23
Post-only	13	12	1	26

$\chi^2 = .90$; NS

3. *Clinical indications used*

Question 4 in the protocol asked for the clinical indications used in deciding whether or not to order echos for MI patients. As noted previously, the course director had stated that change in echo ordering percentage was less important to him than change in *reasons* for ordering. Specifically, his goal was to encourage use of echocardiography to determine the location of the infarction, by assessing wall motion. Figures 2 and 3 depict the distribution of clinical indications pre- and post-program, for the pre-post attendee group and controls, respectively. Each figure shows the percentage of respondents who mentioned one or more clinical indications in each of the following categories:

FIGURE 2
INDICATIONS FOR ECHO,
PATIENTS WITH SUSPECTED ACUTE MYOCARDIAL INFARCTION
ATTENDEES

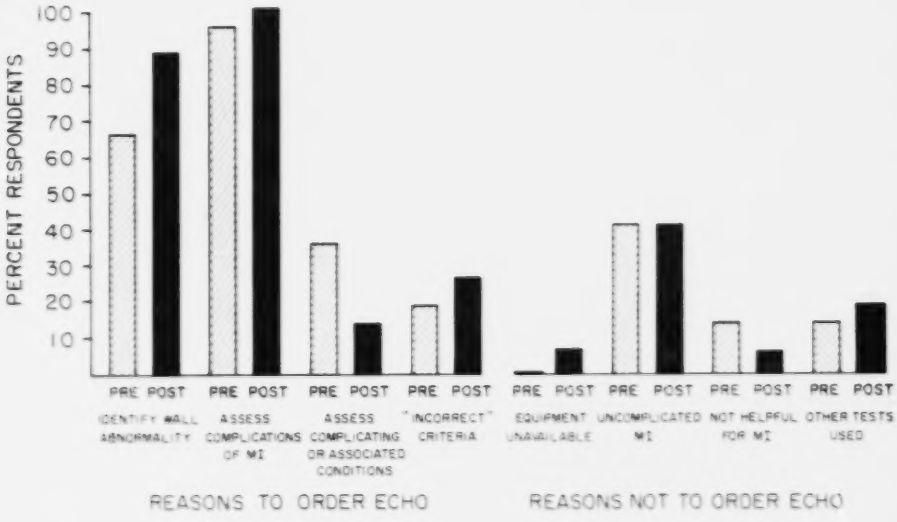
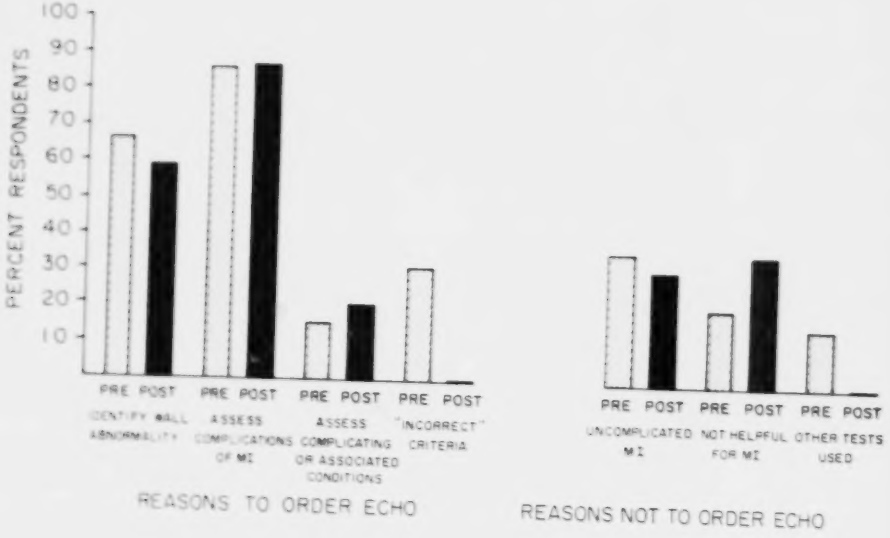


FIGURE 3
INDICATIONS FOR ECHO,
PATIENTS WITH SUSPECTED ACUTE MYOCARDIAL INFARCTION,
CONTROLS



Identify wall abnormality includes: "routine" use of echo for MI, chest pain, "determine presence or location," "assess wall motion," and "assess effects of Streptokinase treatment."
Assess complications of MI includes: "complicated cases," transmural thrombus, pericardial disease, congestive heart failure, left ventricular function, chamber size, pulmonary edema, cardiogenic shock, hypotension, ventricular hypertrophy, ventricular aneurysm, cardiomegaly, papillary muscle dysfunction, septal rupture, and "new murmurs."
Complicating or associated conditions (not necessarily a complication of the MI itself) include: valve disease, cardiomyopathy, and congenital heart disease.
"Incorrect" responses (as identified by the course director) include: hypertension, endocarditis, SABE/vegetation, mitral valve prolapse, left or right bundle branch block, arrhythmia, stroke or transient ischemic attack, tamponade, and aortic dissection.
Each figure also includes reported indications *not to order* echo for MI patients: *equipment not available, uncomplicated case, not helpful for MI patients,* and *other test(s) used* (such as MUGA). Of these only the first was indicated by the course director as a "correct" response.

Among pre-post attendees (Figure 2), patterns of clinical indications before and after the program were similar, with two exceptions. First, those mentioning use of echo for identifying wall abnormalities increased from 65% of

the sample pre program, to 87% post program. This shift is in the desired direction. Second, those mentioning complicating or associated conditions decreased from 35% to 13%, a "neutral" change. Physicians giving "incorrect" responses were few in both administrations, except for those who mentioned "uncomplicated case" as a reason not to order: this response was given by 39% of the physicians, both pre and post program.

Patterns of clinical indications among control physicians (Figure 3) were different from attendees in an important respect: while the percentage of those mentioning "wall abnormalities" was equal to that of the attendee group pre-program, *fewer* mentioned this indication post-program. Other changes in the control group involve numbers too small to be meaningful.

In general, an analysis of clinical indications for MI suggests that the reported increase in echo ordering by attendees is accounted for, at least in part, by a greater tendency to use echocardiography for assessment of wall motion. This trend is not evident in the control physicians, whose patterns of response show less change pre-post program.

D. *Objective 2: Reduce routine use of echo for stroke patients for the purpose of locating possible source of embolus.*

1. *Coverage*

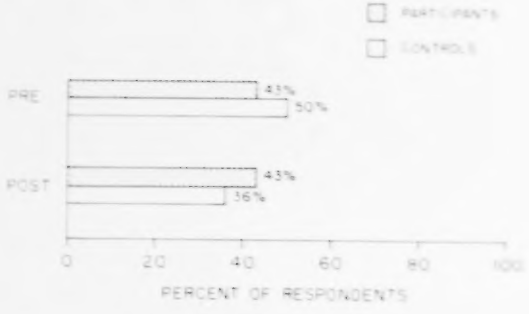
Stroke was not covered as a specific item on the program. The course director did, however, refer to stroke during the afternoon session of the second day as part of his presentation on cardiac masses. For approximately 10 minutes the course director stressed how echo is *not generally helpful* for stroke patients, if the purpose is to rule out the heart as a possible source of the embolus. He cited an array of clinical studies indicating low yield for this procedure, to buttress his argument.

2. *Physicians at criterion, pre and post program*

Physicians were judged to be at criterion if they obtained echos for stroke patients *only for reasons of suspected underlying heart disease*. Other responses, including specifically to "locate source of embolus," were considered "incorrect."

Figure 4 shows the percentage of pre-post attendees and controls meeting this objective, pre and post course. The two groups were essentially the same

Figure 4
PERCENT OF RESPONDENTS MEETING
OBJECTIVE 2 (1984): Use of Echocardiography
for Stroke Patients



before the program, and the control group showed a slight decline in criterion performance in the post-program interview. Individual pre-post change is shown in Table 9.

Table 9

Physicians at Criterion on
Objective 2:
Pre vs. Post Program

ATTENDEES

		Post Program		
		Not at Criterion	At Criterion	Total
Pre	Not at Criterion	11	2	13
Program	At Criterion	2	8	10
	Total	13	10	23

(Statistic incalculable)

CONTROLS

		Post Program		
		Not at Criterion	At Criterion	Total
Pre	Not at Criterion	7	0	7
Program	At Criterion	2	5	7
	Total	9	5	14

$\chi^2 = .50$; NS

Little change is evident in either group, which is not surprising, given the scant program coverage of this objective. Among attendees, two physicians went from non-criterion to criterion performance. Both physicians see only small numbers of stroke patients, although one did mention specifically that he had decided that echos "were not helpful in diagnostic evaluation of patients with CVA," and was ordering them less often after the course. Two other physicians, however, shifted in the direction *opposite* from that desired, both because they mentioned "source of embolus" as a reason for ordering in the post-program interview; one said he was "more attuned to looking for sources of emboli than before [the course]," and now uses echo on nearly all stroke patients. Clearly, the ten-minute educational "dose" during the course changed few minds.

3. *Frequency of use: pre-post course*

a. *Echos ordered/patients seen.* The protocol (both pre and post program) asked for the number of patients respondents managed or participated in managing with stroke, and the number of those patients for whom an echo was ordered, during the preceding two months. Respondents were then asked for how many of these patients they *would have ordered* an echo if no other physician* had been involved. Pre-post percentages were then calculated, based on the number of patients seen. Results are displayed in Table 10.

Table 10

Pre-post responses to Questions 5 and 6:
Percentages of echos that would have
been ordered for stroke patients

	Pre-program		Post-program	
	Mean %	Standard deviation	Mean %	Standard deviation
Pre-post attendees (N = 23)	44.7	40.2	43.7	42.4
Controls (N = 14)	27.2	32.4	43.5	40.6

t(difference in change scores) = .18; NS

Smaller echo-ordering percentages by the control group pre-program complicate interpretation of these data; but it is clear that for attendees no difference exists.

b. *Reported change.* When respondents were asked in the post-program interview whether they had changed their echo ordering frequency for stroke patients, little change was reported by either attendees or controls, as Table 11 indicates.

Table 11

Reported Change in Echo
Ordering for Stroke

	No change	Order more	Order fewer	TOTAL
Attendees	38	5	6	49
Controls	13	1	0	14
	51	6	6	63

$\chi^2 = 3.46$; NS

*Pilot tests of the protocol had indicated that cardiologists did not often manage stroke patients independently, but rather on a consulting basis with a neurologist. Phrasing of the question was then changed to reflect what respondents would have done themselves. Thus, responses sometimes reflect more *intention* than actual behavior.

Among attendees, approximately one in five indicated a behavioral change for stroke patients; but of these, only about half changed in the desired direction. Most control members indicated no change at all. No significant difference was found between the two attendee groups (Table 12).

Table 12

Reported Change in Echo
Pre-Post vs. Post-only Attendees

	No change	Order more	Order fewer	TOTAL
Pre-post	16	3	4	23
Post-only	22	3	1	26
	38	6	5	49

$\chi^2 = 3.36$; NS

4. *Clinical indications used*

Despite the apparent lack of behavioral change, it is possible that the program had some impact on attendees' *reasons* for ordering. Figures 5 and 6 display pre-post distributions of these clinical indications (Question 7 on the protocol), for pre-post attendees and controls, respectively. Responses were classified in the following way:

Suspected underlying heart disease includes: valve disease, myocardial infarction (new or old), coronary artery disease, ventricular aneurysm, chest pain, myxoma, SABE/vegetation, endocarditis, IHSS/Cardiomyopathy, arrhythmia, murmur, congestive heart failure, cardiomegaly, aortic dissection, rheumatic heart disease, prosthetic valve evaluation, ventricular hypertrophy, and "suspected underlying heart disease" (not otherwise specified).

Source of embolus was coded separately if specifically mentioned as a reason to order echo.

"Incorrect" responses (as identified by the course director) include: patient age, "no good explanation for stroke," hypertension, pericardial disease, evaluation of chamber size or left ventricular function, mitral valve prolapse, transient ischemic attack, and shunts.

Reasons *not* to order echo were classified as follows: *lack of heart disease; routine, uncomplicated, etiology known* and *"incorrect" responses*, including patient age and any of the conditions listed above under "suspected underlying heart disease."

FIGURE 5
INDICATIONS FOR ECHO,
PATIENTS WITH STROKE
ATTENDEES

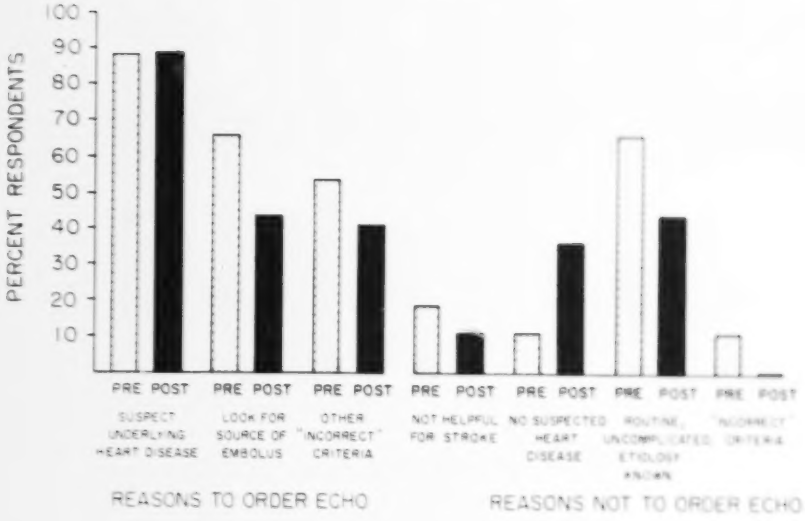


FIGURE 6
INDICATIONS FOR ECHO,
STROKE PATIENTS
CONTROLS

A large percentage (nearly 90%) of both attendees and controls indicated "suspected underlying heart disease" as a reason for ordering echo for stroke patients, and this percentage did not change for either group, pre-post program. Attendees who specifically mentioned, "search for possible source of embolus," however, decreased from 65% to 43% of the sample, while the corresponding percentage of control physicians increased somewhat. A similar pre-post disparity is evident between groups in percentages of those who mentioned "routine, uncomplicated, or etiology known" as a reason *not* to order an echo.

Attendee/control group patterns are more alike elsewhere in the figures: both groups reduced the frequency of other "incorrect" responses pre-post, small numbers indicated echo as "not helpful" for stroke, and both groups mentioned "lack of heart disease" relatively more frequently as a reason not to order echo, after the program.

In sum, of the two apparent attendee/control group differences in pre-post response patterns, one, "source of embolus," was in the direction deemed most important by the course director.

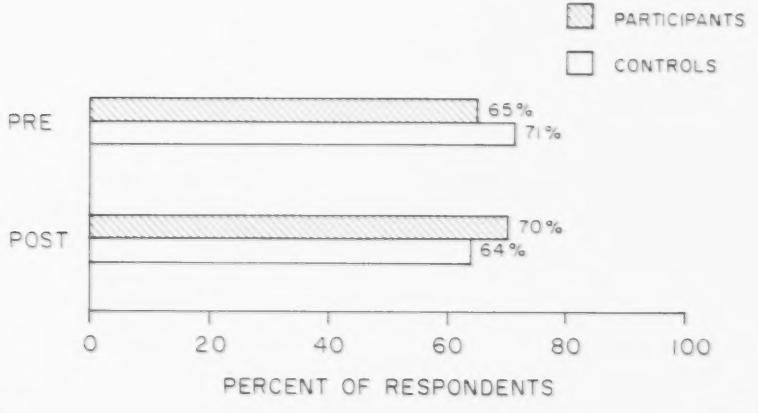
E. *Objective 3: Reduce use of echo for patients with ventricular arrhythmia uncomplicated by other conditions.*

1. *Coverage*

Arrhythmia was not covered as a specific topic during the Heart House course and the objective was not addressed as part of any topic area, despite occasional references. Thus, for the purposes of this study, any behavioral change identified in the analysis would necessarily be due to factors *other than* the Heart House course, or alternatively, to artifacts of the research design or method.

2. *Physicians at criterion, pre-post program*

Figure 7
PERCENT OF RESPONDENTS MEETING OBJECTIVE 3 (1984): Use of Echocardiography for Arrhythmia Patients



Physicians were judged to be "at criterion" if they ordered echos for patients having conditions *associated with* arrhythmia, such as valve disease, coronary artery disease, or ventricular aneurysm, and not for arrhythmia alone. As figure 7 indicates, pre-post attendees and controls were approximately equal in both interviews. Individual breakdowns are shown in Table 13.

Table 13

Physicians At Criterion
On Objective 3:
Pre vs. Post Program

ATTENDEES

		Post Program		
		Not at Criterion	At Criterion	Total
Pre	Not at Criterion	7	1	8
Program	At Criterion	0	15	15
	Total	7	16	23

CONTROLS

		Post Program		
		Not at Criterion	At Criterion	Total
Pre	Not at Criterion	4	0	4
Program	At Criterion	1	9	10
	Total	5	9	14

There was little shift in criterion level between the two interviews. The one attendee who changed in the "desired" direction indicated he became more "discriminating," and now uses the procedure primarily for patients with MI and other associated conditions.

3. *Frequency of use: pre-post course*

a. *Echos ordered/patients seen.* Respondents were asked for the number of patients managed with ventricular arrhythmia during the preceding two months and for the number of echos ordered for those patients. Pre-post results are given in Table 14.

Table 14

Pre-post responses to Question 8: Percentages of echos ordered for patients with ventricular arrhythmia

	Pre-program		Post-program	
	Mean %	Standard deviation	Mean %	Standard deviation
Pre-post attendees (N = 23)	54.9	43.0	68.8	38.6
Controls (N = 14)	65.0	34.8	56.3	36.8

t(difference in change scores) = 1.71; NS

While attendees increased their echo-ordering percentages slightly (opposite from the desired direction), and controls decreased slightly, differences were not statistically significant.

b. *Reported change.* As the use of echo for patients with ventricular arrhythmia was not specifically addressed during the program, no significant difference would be expected between attendees and controls. As Tables 15 and 16 indicate, these expectations were verified.

4. *Clinical indications used*

Figures 8 and 9 display the categories of clinical indications for echo for patients with ventricular arrhythmia. Response categories were defined as follows:

Conditions associated with arrhythmia (identified by the course director as "correct" reasons to order echo) include: valve disease, coronary artery disease (including myocardial infarction), chest pain, ventricular aneurysm, mitral valve prolapse, cardiomyopathy, congestive heart failure, cardiomegaly, myxoma, murmur, pericardial disease, atrial septal defect, endocarditis, prosthetic valve evaluation, and syncope.

Arrhythmia (an "incorrect" response) includes both those who would order for complex arrhythmias and those who would "order routinely" for patients with this condition.

Conditions not associated with arrhythmia (and thus also "incorrect") include: ventricular hypertrophy, embolus or thrombus, left or right bundle branch block, evaluation of chamber size or left ventricular function, congenital heart disease, myocarditis, and assessment of wall motion.

Categories of indications not to order were: *not helpful in arrhythmia; other techniques* (such as MUGA) *used; uncomplicated, or no evidence of cardiac involvement; cause of arrhythmia already known;* and *"incorrect" responses,* including any response included under "conditions associated with arrhythmia" above.

Table 15

Responses to Question 12c:
"Is the frequency with which you order echocardiograms different now from what it was in February, *or not*, for patients with ventricular arrhythmia?"

	No change	Order more	Order fewer	TOTAL
Attendees	39	9	1	49
Controls	13	1	0	14
	52	10	1	63

$\chi^2 = .73$; NS

Table 16

Reported Change in Echo
Pre-Post vs. Post-only attendees

	No change	Order more	Order fewer	TOTAL
Pre-post	18	5	0	23
Post-only	21	4	1	26
	39	9	1	49

$\chi^2 = 1.21$; NS

FIGURE 8
INDICATIONS FOR ECHO,
PATIENTS WITH VENTRICULAR ARRHYTHMIA
ATTENDEES

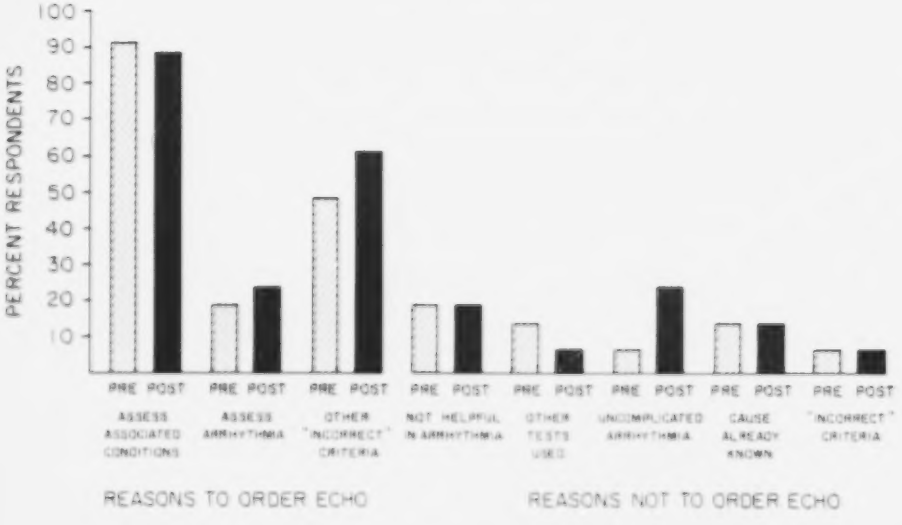
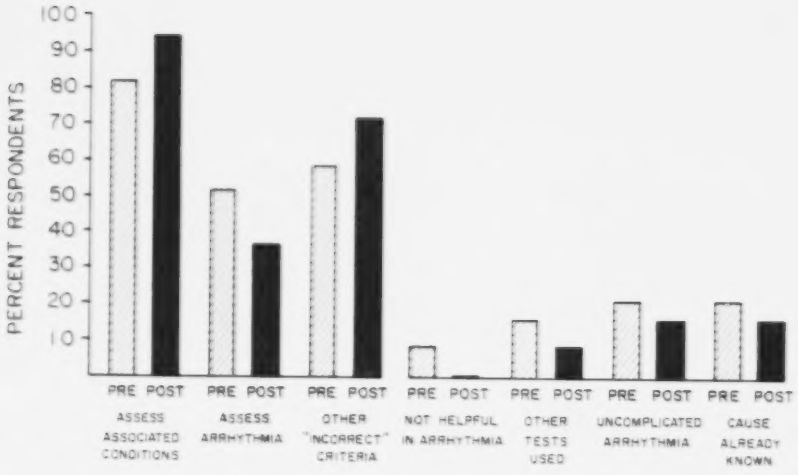


FIGURE 9
INDICATIONS FOR ECHO,
PATIENTS WITH VENTRICULAR ARRHYTHMIA
CONTROLS



An inspection of Figures 8 and 9 reveals that attendees and controls displayed similar response patterns; neither group showed much pre-post change, even though some opportunity for change existed. For example, more than half of the attendees and controls mentioned "conditions not associated with arrhythmia" in the pre-program interview, an "incorrect" response. Neither group decreased the frequency of this response in the post-program interview.

As a further check of potential pre-test sensitization, responses to "clinical indicators" questions for each of the three conditions studied (myocardial infarction, stroke, and arrhythmia) were tabulated separately for attendees in the pre-post and post-only groups, then compared. Presumably, if a pre-program interview influenced responses to a post-program interview, the two groups would vary in their distributions of responses to these questions. None of the analyses approached statistical significance.

F. Source of information for use of echo

Question 11 of the protocol asked respondents where they learned the clinical indications they had mentioned earlier for ordering echos for patients with myocardial infarction, stroke, and ventricular arrhythmia. Of greatest interest was an analysis of the relative influence of formal continuing medical education, and specifically Heart House, as a source of this information.

Table 17

Sources of criteria for clinical indications,
Pre-post program: attendees vs. controls

	Pre-post Attendees (N = 23)		Controls (N = 14)	
Sources	Pre-program	Post-program	Pre-program	Post-program
Formal CME	9	11	5	8
Heart House courses	2	4	3	1
All other*	23	22	14	13

*Includes (in order of frequency) literature, formal training, personal experience, hospital conferences, and professional meetings.

Formal CME courses were listed as a source of information by about half of the respondents, both attendees and controls; Heart House courses were mentioned specifically only infrequently. Little change is evident in this pattern, pre-post program, by either group. The post-program interview asked, in addition, which one source respondents considered *most influential*. Their answers are summarized in Table 18.

Table 18

Single most influential source
(all attendees vs. controls)

	Attendees	Controls
Formal CME	11	4
Heart House	5	1
All other	30	7
No response	3	2
	N = 49	14

The single most influential source of information was listed as formal CME courses by about one-fourth of both attendees and controls. Little difference is evident in the patterns of attendee and control group responses.

G. *Identified impacts of the Heart House program on physician practice behaviors, knowledge, and attitudes*

At the end of the post-program interview, attendees were asked two questions: "Have you made, or will you make, any changes in your practice as a result of attending the Heart House course in March?"; and, "How, if at all, did the Heart House program affect your *thinking or feeling* about echocardiography?" Responses to these questions were analyzed together in an attempt to determine overall reported impact. Forty-six of the 49 attendees reported some impact on knowledge, attitudes, or practice behavior. Of these 46 physicians, twenty cited knowledge impacts, thirty-one cited changes in attitude towards echo, and thirty-one listed specific changes in practice behavior. (Numbers add to more than 46 due to multiple responses.) A content analysis of each category follows.

Impacts on *knowledge* were least frequently mentioned—possibly because some respondents assumed knowledge gain and chose to answer the questions in terms of attitudes and behaviors. Knowledge responses are shown in Table 19.

Table 19

Reported effects on knowledge of echocardiography:
All attendees

	Frequency
Learned new techniques or uses (e.g., contrast, Doppler, exercise)	6
Learned to evaluate echocardiograms more accurately	4
Learned diagnostic potential (e.g., for LV function, ejection fractions)	3
Put echocardiography in perspective: more discriminating in echo ordering	3
Reviewed important concepts	3
"Bits of information"	1
Learned how echo is used in other parts of the country	1

Six respondents cited pure knowledge gain, in the form of "newer techniques or uses of echo," as a result of the program. Ten physicians reported more application-related learnings, in terms of skill development with some potential for behavioral change: four felt they could more accurately evaluate echos, three felt they learned about the diagnostic potential of echo, and three felt they could now be more discriminating in echo ordering. Three respondents indicated that, while they had not necessarily learned anything new, the course was helpful for review and reinforcement reasons.

Impacts on *attitudes* towards echocardiography were fairly consistent, as the table below indicates:

Table 20

Reported effects on attitudes towards echocardiography: All attendees

	Frequency
Overall usefulness, reliability	15
Promising potential	7
Cost-effectiveness	3
Usefulness for coronary artery disease	2
Lack of usefulness for stroke	1
Non-invasive nature of test	1
Usefulness for screening	1
Practicality for office use	1
Value of 2-D	1

By far the most common remark was that the course confirmed respondents' sense of echo as a useful and reliable clinical tool. Physicians felt more "encouraged" and "confident" about its value as an aid to their clinical diagnostic abilities.

Three respondents volunteered attitude changes related to objectives covered in the interview protocol; and three found echo to be useful for practical reasons (non-invasive, useful for screening, practical for office use).

While not specifically sought, intermingled with statements on attitude *change* were expressed attitudes towards the course itself. Six respondents volunteered that they found the program worthwhile; two had sought more "specialized" information; one wanted more "hands on" sessions; and one objected to the redirection of the course to those with more technical experience.

More than three out of five attendees indicated a change in their *practice behavior* attributable to the Heart House progrm. Table 21 shows how diverse these practice changes were.

The most frequently-reported behavior change was to increase use of echo for patients with myocardial infarction. While this response may have been suggested in part by the detailed coverage of MI earlier in the protocol, its frequency of mention (and the lack of references to stroke and arrhythmia) suggests a significant impact. Several responses referred to actual or intended purchase of echo equipment, especially 2-D and Doppler. These responses were often linked to cost considerations: several of those who had not yet enhanced their technology intended to do so "when proven cost-effective." Several physicians also reported increased use of Doppler, for such conditions as congenital heart disease, murmur, and assessment of cardiac output. Two other individual comments are worth singling out. One physician, the director of an echo lab, noted no behavioral changes in his own practice, but found the course sufficiently powerful that he pushed for change in echo-ordering policies in his hospital. Another was so inspired by the course that he registered for a week of special training in echocardiography in another city.

Table 21

Reported effects on practice behavior
All attendees

	Frequency
Increased use of myocardial infarction	15
Increased use in general	6
Obtained 2-D capability	5
Obtained Doppler capability	4
Increased use of Doppler	4
Read more echos	3
Obtained digital and/or stress echo	2
Used stress test more	2
Used for assessing wall motion	2
Changed protocols for echo ordering in hospital	1
To take additional training	1
Subscribed to echo journal	1
Obtained contrast echo	1
Used more M-Mode for arrhythmia	1
Possibly decreased use — more selective	1

In all, respondents revealed a wide range of both tangible and intangible effects of the Heart House course. Across knowledge, attitude, and behavior categories, several related themes emerged. While attendees did not as a rule indicate that much of the informatoin was new, many found the course to reinforce prior knowledge, and to increase their confidence both in the usefulness of the technique and in their own skills. Thus, the dominant behavior change was increased use, both in general and for specific conditions, most notably myocardial infarction. Secondarily, the course seemed to encourage a number of physicians to upgrade both their own skills and their technical capabilities.

H. *Case studies*

Interview synopses of each study participant are given in Appendix C. While these are summaries only, and do not contain all of the information collected in the interview, they do sketch the practice context, overall and specific use of echo, and for attendees, perceived impacts of the Heart House course. (To preserve anonymity, masculine pronouns are used throughout the cases.) Even a quick perusal of these cases reveals the diversity of practice patterns within this group of physicians and, accordingly, the diverse kinds of impact the course may have had. Cases are presented first for attendees, then controls. (Those with post-only interviews are noted.) Each group has been divided into two clusters: those who appeared to have made one or more practice changes after the course, and those who did not. For attendees, this latter group includes not only those for whom the Heart House course had no apparent impact at all, but also those who cited strictly knowledge gain, attitude change, or *reinforcement* of present beliefs and practices. Categorized in this fashion, 26 of the 49 attendees (53%) were placed into the "practice change" group, as were 1 of the 14 controls (7%).

The reader is invited to peruse these cases to gain a better understanding of how this "practice change" criterion was employed.

Reliability and validity assessment

A. *Reliability*

Six cardiologists were identified who would not be attending the Heart House course, to serve as "test cases." Each was to be interviewed twice during the pre-program phase, once each by two members of the interview team. Interviewers would not know their identity as test cases. Interview data from these six physicians were analyzed separately, and the responses to the separate interviews were compared for congruence, as an estimate of test — retest reliability.

Overall, 53% of the coded responses matched exactly; when codes were collapsed into analysis categories, the matching percentage increased to 66%. The largest source of discrepancy was in the number of patients reported seen with MI, stroke, and arrhythmia, and percentage of echocardiograms ordered for these patients. These numbers matched only 39% of the time, even though the interviews took place only a few days apart. Elsewhere, differences lay principally in the level of detail recorded by the interviewer.

B. *Face validity*

1. *Review of interview data by project participants.* Once we had received the completed post-program interview, the summary page at the end was copied and mailed to the respondent, along with the pre-program interview summary (if applicable). Respondents were asked to check the summary(ies) for accuracy, make any corrections, and return the form(s) in a self-addressed, stamped envelope. Respondents were also invited to comment on the interview method itself, as they perceived it. Nineteen participating physicians chose to respond, and none made any corrections to the interview summaries. Eight physicians saw fit to comment on the method, and their responses are reproduced below.

> Telephone interviews by physicians are reliable and effective. (2)
>
> The interview was worthwhile. (2)
>
> I am not sure the method is effective—maybe a better way would be to send out program objectives, then ask if they were met.
>
> Interviews are OK, although I think the interviewee may be tempted to exaggerate.
>
> I would like some idea of what my grade or ranking would be to the questions. I am concerned about my knowledge of echo.
>
> The interview didn't really question the success of *presentation* in the course, structure of the course, duplication or relevance of some of the material.

2. *Debriefing of physician interviewers.* After all post-program interviews had been completed, a project staff member arranged for an individual telephone conference with each interviewer to recap the experience and elicit ideas for modification of the protocol or procedure. Each conversation covered the following general questions:

1) How difficult were the interviews to arrange?
2) What was the range of cooperation you experienced, pre versus post interview?
3) Overall, how credible did you feel the responses were? At which points during the interview did you feel there were problems with the validity

or reliability of response?

4) Were the interviews too long? If so, how could they be made shorter?
5) How could you have been better prepared for the interviews?
6) What were the most and least positive aspects of participating in this project?
7) In general, what do you think now about the accuracy and feasibility of this method of evaluating Heart House courses?

Five of the six interviewers agreed that scheduling interviews was the most difficult part of the study. Both interviewer and respondent typically had very busy schedules, and often the interview appointment was considerably more difficult for some interviewers than others: three physicians essentially completed their quota on schedule, while the others were unable to finish theirs until weeks later. Apparently, persistence made the difference: those who were more successful cited the diligence of their office secretaries. As one interviewer said, "(Arranging appointments) requires skill in knowing how physicians' offices work." One interviewer also placed a number of scheduling calls himself, and said that this helped somewhat. Once the interview began, the interviewers had little trouble. Respondents were described as "courteous," "interested," and "cooperative." Three interviewers mentioned specifically that their biggest problem during the interview was maintaining control. As one said, "People wanted to be heard." Two interviewers did perceive some resentment, or at least less interest, among those who had undergone a pre-program interview; others noticed no difference between the study groups in this respect.

The interviewers had different points of view as to the credibility of the quantitative information they obtained in the interviews (i.e., questions on numbers of patients seen or echos ordered). One interviewer had "great problems" with the credibility of these numbers, and two felt that respondents were maybe trying to impress them. Other interviewers felt that these data were reasonably accurate estimates, at least in terms of percentages. All interviewers felt more comfortable with the credibility of responses to "clinical indications" questions, although physicians with large practices were perhaps less able to cite specific patient cases.

Interviewers disagreed about the length of the interviews. Two felt they were "a little long" in the sense that some of the questions seemed redundant toward the end. The others did not share that view; one pointed out that the respondents themselves were largely responsible for the length of the interview, and they had been informed in advance approximately how long it would take. Thus, in his opinion, interview length was partially responsible for scheduling problems.

Interviewers were generally comfortable with their preparation for the project as a result of the training session in January. One interviewer wanted more extensive practice with "probing" skills and ways of obtaining specific information; another felt at times uncomfortable with his ability to keep respondents on track. All felt more comfortable with the protocol after practice.

Five of the six interviewers felt that the most positive outcome of their experience was the opportunity it afforded for interaction with their colleagues. Most were surprised, even amazed, at the diversity of practice patterns in echocardiography. Some of the interviewers also noted that hearing answers that either reinforced or challenged their own beliefs and practices was also a learning experience for them. Not unexpectedly, the problem of interview

scheduling and deadlines tended to be the least positive experience. Two reported becoming bored with the interviews near the end of the study, and two felt frustrated with some respondents who didn't seem to understand the purpose of the study. One interviewer said that the least positive aspect of the study was covering the "arrhythmia" section of the protocol, which tended to elicit less specific responses.

When asked to assess the value of this interview method based on their experience with it, responses varied considerably. Three interviewers reported having "mixed feelings," wondering whether the information obtained would be worth the time and effort put in, and so withheld judgment until they could review the results. Another found the interview a "reasonable" method of assessing change, and two felt the technique was "valuable and worthwhile." One physician reported feeling dubious about the method at first, but later became convinced of its utility as the interviews progressed. Another physician noted that even though this method of evaluation is expensive, the cost may be warranted compared to the cost of CME. All physicians felt they were able to obtain important information from respondents that would have been unavailable by other means, although one thought that at least some of the information could have been obtained by a sophisticated clinical technician. Another, however, felt that only physicians could "sift the wheat from the chaff" and "sort through verbiage." This appeared to be the dominant view.

In sum, interviewers enjoyed the experience despite the logistical problems, and felt the information they obtained was credible and important, although they disagreed somewhat on the method's cost-effectiveness.

C. *Content validity*

The extent to which the interview protocol covered a representative and important sample of program content was problematic. While the protocol was never intended to cover all or even most of the program content, the three objectives selected for inclusion by the course director and his faculty were chosen for their overall importance and perceived opportunity for short-term behavioral change. But only the first objective, myocardial infarction, was covered extensively during the program. The extent to which study findings could be generalized to all of the material taught during the course was therefore severely limited. Openended questions at the end of the interview protocol did provide an opportunity for respondents to report outcomes not covered by the prespecified objectives.

D. *Construct validity*

The extent to which the interview data reflected *real change* (rather than respondent bias or artifacts of the design or data collection) was assessed in several ways.

1. *Chart reviews*

A questionnaire was designed to elicit specific information to be abstracted from patient charts. In that questionnaire (Appendix D) information was sought on the number of patients with acute myocardial infarction seen by the responding physician during two intervals: the two-month period immediately preceding the Heart House course, and the two-month period immediately following the course. Respondents were also asked to indicate for

which of those patients an echocardiogram was ordered. This information would then be used for comparison with respondents' reports of change in echo ordering behavior. Chart data were requested from 50% of the post-program interview respondents, excluding controls. Selection of this sample proceeded as follows. Interviewers were instructed to request permission to access patient charts from the first three respondents assigned to them in each experimental group following the interview (see protocol), and if they encountered refusals, to continue asking additional respondents until that quota was met. Compensation of $100 was offered each respondent to help defray the costs of data collection. Of 35 physicians asked, 25 agreed to allow the questionnaire to be completed by someone in their office, and a total of 18 usable questionnaires were ultimately returned.

Results. The eighteen chart summaries were compared with corresponding interview results in two ways. First, we wanted to see how congruent physicians' *reported* changes in echo ordering for MI patients were (Question 12: "Is the frequency with which you order echocardiograms different now from what it was in February, *or not*, for patients with suspected acute myocardial infarction?") with *recorded* evidence in patient charts. Second, we wanted to assess the consistency between interviews and chart surveys of numbers and percentages of echos ordered for MI patients, both pre and post the Heart House course. Data pertinent to the first question are displayed in Table 22.

Table 22

Change in Echo Ordering
for MI Patients:
Interview vs. Chart Review Data

		Change reported in interview?		
		Yes	No	Total
Change evident in charts?	Yes	7	1	8
	No	3	7	10
	TOTAL	10	8	18

Of the 18 attendees who provided patient chart data, ten reported an increase in echo ordering after the program. An increase in echo ordering was observed in seven of these ten from the charts. Eight attendees had reported no change, and no change was found in the chart interviewers' reports of change or no change.

Table 23 shows the "reported" vs. "recorded" numbers and percentages of echos ordered for MI patients, pre-post program. In the pre-program interviews, attendees tended to underreport echos and overreport numbers of patients; in the post program interview, they tended to overreport echos. Thus, while the chart data revealed an increase in echo ordering behavior pre-post program, the increase is smaller than that revealed by the interview data. For the eight physicians on whom both pre and post interview data are available, the direction of change (or no change) in both directions and charts is the same in six.

Table 23

Patients Seen and Echos Ordered,
Pre–Post Course
Interviews vs. Chart Surveys

	Interview				Chart Survey			
	Pre		Post		Pre		Post	
Respondent	echos/pts.	%	echos/pts.	%	echos/pts.	%	echos/pts.	%
1	10/10	100	10/10	100	2/2	100	1/2	50
2	5/15	33	20/20	100	0/1	0	13/13	100
3	2/5	40	0/3	0	2/5	40	3/5	60
4	2/30	7	No data avail.		0/4	0	13/20	65
5	2/20	10	0/20	0	2/13	15	2/22	9
6	0/15	0	0/6	0	1/10	10	1/28	4
7	13/20	65	7/40	18	9/18	50	12/30	40
8	4/10	40	6/8	75	12/12	100	3/5	60
9	0/80	0	25/40	63	34/92	37	43/86	50
10			4/5	80	9/23	39	15/16	94
11			3/4	75	4/8	50	1/4	25
12			35/40	88	22/22	100	28/28	100
13			4/15	27	0/6	0	1/9	11
14			6/12	50	1/7	14	1/6	17
15			9/20	45	3/8	38	3/10	30
16			4/6	67	2/3	67	2/3	67
17			18/30	60	3/8	38	3/9	33
18			20/20	100	1/2	50	1/2	50
	38/205	19	62/157	39	146/298	49	171/299	57

Taken together, Tables 22 and 23 suggest, first, that at a very general level, good correspondence exists between interview and chart data: reported change or lack thereof in echo ordering was confirmed by the chart about three out of four times. Reports of specific numbers, as predicted by the interviewers, tended to be less reliable. These interpretations are all based on the assumption that the chart survey reflects actual behavior, and that the period covered by the survey corresponds with that used by the physician during the interview to formulate his or her response. Both of these assumptions are open to challenge. For example, in the interview physicians may have reported *recent* practice change, whereas the chart survey covered patients seen within the previous 60 days.

2. *Consistency of reported change with program emphasis*

The interview protocol had an unintentional "control" built into it, in the form of the stroke and ventricular arrhythmia objectives, which received scant or no direct attention during the course. While this posed a problem of content validity, it also gave us an opportunity to see if program-related change was reported with an inaccurate reference to Heart House in these areas. The interview data reflected change, however, that was directly proportional to the degree of program emphasis: significant change in the MI objective, negligible change in the stroke objective, and no change at all in the arrhythmia objective. These findings help negate the possibility that respondents assumed the interviewer was looking for change in these areas, and tried to

accommodate by reporting it.

3. *Design or data collection problems*

a. *Pre-test sensitization.* The research design called for the random assignment of program attendees into two groups: those who were interviewed both pre and post program and those who were interviewed post-program only. The purpose of splitting attendees in this fashion was to test whether a pre-program interview would in any way "sensitize" respondents to the material covered in the program and thus bias the post-program interviews. No evidence was found that such sensitization took place. No statistically significant difference was found between the two groups in numbers or percentages of echos ordered, clinical indications listed, or behavioral change reported.

b. *Differential experimental mortality.* Complete interview data were collected on 61% of total program attendees, and 44% of program cancellations (controls). While there was no reason to suspect that study participants were not representative of the available population, that possibility does exist. Most of the attrition in both groups was due to late course registration, which made it impossible to randomize group assignments and schedule and carry out pre-program interviews. When participation rates were calculated on the basis of those who were *contacted* for participation, rates were 70% for the pre-post attendee group, 79% for the post-only attendee group, and 67% for the control group. The need to interview physicians in Groups 1 and 3 twice did create more attrition in the form of increased likelihood of canceled appointments or refusal to be interviewed: four physicians in the control group were lost between the two interviews. The important fact, however, is that there appears to have been no *differential* attrition between pre-post attendees and controls, where most statistical comparisons were made.

In sum, the research in the project's first year produced rich and detailed information on physician practice patterns, and some evidence of Heart House impact. Unquestionably, however, the interview protocol developed was cumbersome and expensive. While most course attendees agreed to participate in the study, scheduling and carrying out the interviews at times mutually convenient to both interviewer and respondent was extraordinarily difficult in some cases. As we planned the assessment of another Heart House course in the project's second year, we concentrated on making the protocol more flexible, more sensitive to unexpected outcomes, and easier for both interviewers and respondents to use.

Chapter 4

Study Procedures and Results–1984-85

Implementation of the project in its first year resulted in three important accomplishments: good cooperation and participation in the interviews by attendees and controls, a rich and detailed data base on physician practices, and evidence of behavioral change in one of the three program objectives. Several problems were apparent, however, requiring some corrective action in the project's second year. These problems are listed below, with corrective actions noted:

1. The number of attendees supplying both pre and post program interviews was relatively small (n = 23), thus reducing statistical power. We therefore eliminated the "post only" experimental group. The first year analysis had uncovered no evidence of "sensitization" caused by pre-program interview, and collecting pre–post data from all attendee participants would substantially increase the prospects of finding behavioral change.

2. Incomplete coverage was given to two of the three original program objectives during the course. The evaluated program was being offered for the first time, and significant changes in content and emphasis were made by the program faculty once the course began. We decided to select an "established program" for assessment in 1984-85, involve the program director and faculty more in interview protocol development, and emphasize the importance of matching protocol content with course content.

3. Interviews were perceived by some as being too long (averaging nearly 25 minutes in the post-program phase). We would reduce the number of objectives covered in the protocol from three to two, and streamline the protocol as much as possible.

4. Reliability of the protocol needed further study. We would repeat "test case" interviews, and subject the test case data to more intensive statistical analysis.

5. Scheduling the interviews was sometimes difficult, especially in the post-program phase. In the 1984-85 interviewer training session we would discuss the problem and identify alternative strategies.

6. Obtaining patient chart data from some participants was difficult. We decided to work with the physician's clerical staff where possible, and make part of the stipend contingent on our receipt of the information.

Finally, we needed to consider how Heart House might continue using physician interviews once the current project ended. One alternative explored was to employ a pre-program survey at the beginning of the Heart House course, using these data as a baseline against which to compare responses on a post-program interview. Plans were made to conduct such a survey, and compare responses for congruence to those given in the pre-program interview.

All of these modifications were agreed to during a meeting at Heart House in December, 1984, attended by project staff members, representatives of the project review committee, and ACC staff. Changes are reflected in the description of study procedures for 1984-85 which follows.

A. *Program selection*

Following discussion of preliminary first-year results with the project review committee in June, 1984, project staff and committee members discussed possible programs for assessment during the 1984-85 year. Five criteria had to be met: course timing (ideally December–February, to allow enough time for protocol development and data analysis), potentially high attendance, interest and cooperation of program directors, likelihood of measurable change, and stability of course content (i.e., a course that had been given and refined several times). After looking at the alternatives, the committee recommended "Rehabilitation of the Coronary Patient," scheduled for February 4-6, 1985. The only real concern was the attendance criterion, as attendance by physicians at this course had declined somewhat during the past two or three years. To increase the probability of having a fully-subscribed program, it was agreed that program announcements would be mailed twice, that non-physicians would not be registered until the last minute, and that arrangements would be made to select a control group from physicians registering for another Heart House program, rather than rely on program cancellations.

Following the meeting, the course director was contacted and her participation enlisted. Project staff and committee members met with the course director in July, 1984, to discuss the project in more detail and clarify course and protocol objectives.

B. *Delineation of program objectives*

As a result of the Heart House meeting in July, six program objectives were agreed upon. On the basis of apparent measurability and likelihood of behavioral change, the following objectives were selected for assessment by the research team:

1. "The basis for and implementation of inpatient early ambulation. The importance of risk stratification and the need for pre (hospital) discharge exercise testing in order to identify patients at high risk will have special emphasis in the program. These are timely issues in the field of rehabilitation today."
2. "The importance of risk modification and methodologies for implementation of an effective patient education program."

Objective 1 was to be assessed by analyzing the use of exercise tests for coronary patients around the time of discharge; Objective 2 was to be assessed by analyzing the extent to which physicians focused on modification of specific risk factors in their patient education strategies, post discharge.

C. *Recruitment of program registrants and controls*

Recruitment of registrants for the Heart House course was done in a manner similar to the previous year. A letter describing the study was prepared, signed jointly by the course director and the chairman of the ACC Research in CME Committee and mailed by the ACC to each registrant. The letter contained a postcard to be mailed to project staff, signifying the physician's willingness to participate. All registrants who had not returned their postcards by December 1, 1984, and all physicians registering after that date, were called by one of the project staff and recruited over the phone. Cooperation was

excellent: Of the 66 physicians who ultimately attended the Heart House course, 63 were contacted for the study, and of these 58 agreed to be interviewed.

Selection of control group members. As noted previously, Heart House staff had anticipated that cancellations from the Heart House course would not be sufficient to yield a control group of acceptable size. After consultation with representatives of the project review committee, we decided that the registrants for another Heart House program later in February, "Thromboembolic and Atherosclerotic Disease," could serve this purpose, as type-of-practice profiles were similar for the two program groups. Letters were then mailed to physician registrants for the control program, and recruitment proceeded as above. Control group cooperation was also good: of 37 physician registrants, 27 agreed to be interviewed (8 of the other ten saw no patients and were thus ineligible). Five cancellations from the rehabilitation course also agreed to be interviewed, and were added to the control group.

D. *Development of interview protocol*

A conference call was arranged for late November, 1984, involving program faculty, project staff and ACC staff. The major purposes of the conference were to explain the research project to the program faculty, to emphasize the importance of covering program (particularly protocol) objectives, and to elicit the faculty's ideas on how the protocol might be structured. The course director had already been sent a preliminary version of the protocol. The following points emerged from these discussions:

1. Broaden objective 1 to include nuclear medicine studies and cardiac catheterization as well as exercise tests.
2. Stress physician selectivity in use of these tests (e.g., patients with severe muscle dysfunction should not be evaluated).
3. Define the patient group to include all coronary patients, including those with unstable angina, post bypass surgery, and new angina, as well as those with a recent infarct.

We refined the protocol based on these suggestions, and submitted the draft to the course director for her comment. In addition, the cardiologist member of the project team pilot-tested the draft with three Richmond-based cardiologists. Minor changes in wording were made based on feedback from those sources. A protocol draft was then prepared for the interviewers' training session.

E. *Selection of physician interviewers*

Each of the six ACC-member cardiologists who participated as an interviewer in 1983-84 of the project was invited to reprise his role. All six agreed to participate as interviewers again in the second year.

F. *Interviewer training*

An all-day meeting for project interviewers, project staff, and ACC staff was scheduled at Heart House for November 30, 1984. Having all interviewers return for the project's second year allowed the meeting to be less formal and more collegial. Plans were to discuss first-year results and perceived strengths and weaknesses of the study; to review the current protocol;

to discuss ways of enhancing reliability; to practice and debrief the protocol in pairs; and to make any final changes in the protocol based on interviewers' feedback.

Discussion of the draft protocol with the interviewers quickly revealed their worth as resources to the project—not just as interviewers but also as consultants. They were able to speak both as practicing cardiologists, role-playing how they would respond for language, structure, and flow. A practice session with the draft protocol was followed by an extended group discussion, from which the following major points emerged:

1. Using an all-inclusive definition of "coronary patients" (including angina and CABG as well as MI) as the reference group for Objective 1 would make the protocol unwieldy, and unacceptably time consuming. The group therefore recommended that the protocol focus on infarction patients only.
2. Physicians should be asked how they stratify risk for *all* patients discharged with the above diagnosis, not just those with a good prognosis.
3. Emphasis in the protocol should be on the *reasons* why physicians employ certain tests to stratify risk, as it was likely that nearly all physicians would employ at least some of these procedures.

These suggestions required substantial protocol restructuring. After this was done, interviewers were split into three pairs to practice the new form, playing both interviewer and interviewee roles. The revision proved workable, interview length was reduced to less than 15 minutes, and all interviewers felt comfortable with the protocol's content and sequence.

Finally, project staff led the group in a discussion of reliability concerns. In that discussion we reviewed some of the test case data from the first year to exemplify three sources of unreliability: the interviewer, the respondent, and the protocol. Specific threats to reliability were described and discussed by the group within each source.

Following the interviewers' meeting, a semi-final draft of the protocol was prepared for review by the course director. Final versions of the pre-program, post-program (attendee), and post-program (control) interview protocols are contained in Appendices E, F, and G respectively.

G. *Implementation of pre-program interviews*

As in 1983-84 as soon as consent was obtained from participants and controls, we assigned them randomly to one of the six interviewers. The top part of the protocol was completed with the respondent's name, phone number, and city and state of residence, and mailed to the assigned interviewer. All interviewers were provided with a charge number to be used for telephone contacts. Upon completion of the interview, interviewers completed a summary sheet at the end of the protocol, made a copy of the protocol, and mailed back the original.

Pre-program interviews began the third week of December, 1984, and continued through the last week of January, 1985. All but one of those on the attendee list (57 of 58) were interviewed, resulting in 56 usable protocols. Thirty of 32 controls were interviewed, resulting in 27 usable protocols. (All non-usable protocols were for physicians who saw no coronary patients.) Interviews ranged in length from 10 to 50 minutes, with a mean of 19.2 minutes.

H. *Development of program pretest*

As noted previously, one modification to the original research design was to add a "program pretest" on the first day of the course, containing some of the same questions asked in the pre-program interview, to identify whether attendees would respond to those questions in the same way. If a substantial correlation were found, pre-program interviews might be eliminated in future evaluation studies, thus reducing the cost of the method.

We decided to embed several multiple choice questions into a larger number of non-protocol related questions, so as not to sensitize attendees. We developed four protocol-related items, and the course director added fifteen other items. These were presented one at a time at the beginning of the program. Respondents recorded answers at their terminals. After each item, group responses were displayed on the screen. The Learning Center computer tabulated all responses on an individual basis.

I. *Observation of Heart House program*

Two members of the project team attended the Heart House program in early February, primarily for the purpose of observing and recording the subject matter covered and areas of emphasis. The course director had earlier indicated the sessions during which each program objective would be covered, and observation verified her prediction. The entire program was tape recorded, and a content analysis was performed of program coverage according to each of the two protocol objectives (risk stratification at discharge, patient education strategies). Results of the analysis are given below.

Objective 1: Risk stratification of the MI patient at discharge

Title of presentation	Coverage (minutes)
Rehabilitation of the coronary patient—overview	13
Exercise testing: principles and practice	68
Radionuclide exercise studies	29
TOTAL	110

Objective 2: Educating coronary patients about conventional risk factors

Title of presentation	Coverage (minutes)
Coronary risk factor intervention after myocardial infarction and coronary bypass surgery	30
Educational needs of the coronary patient	38
Psychosocial and behavioral aspects of angina pectoris, myocardial infarction and sudden cardiac death	8
Risk profiles	45
TOTAL	121

During the echo course (assessed during the project's first year), only one of the three program objectives contained in the interview protocol had been covered in detail. Coverage in the 1984-85 course was much more extensive: nearly two hours for Objective 1 (plus approximately 30 minutes of material related indirectly to the objective), and slightly more than two hours for Objective 2. Altogether, program coverage of the two objectives encompassed about one-fourth of total program time.

J. *Implementation of post-program interviews*

Post-program protocols were prepared and mailed to project interviewers in late March, 1985. Interviews were to be conducted between April 8 and May 15. Interviews were randomly assigned although no interviewer was assigned a physician he had interviewed before. Fifty-three of 56 physicians on the attendee list were interviewed, as were 21 of 27 controls. All but two of the completed interviews took place by the May 15 deadline; the others were finished within a week thereafter. Of the noncompleted interviews, three were control group members who declined to be interviewed a second time, while the others could not be reached or scheduled. A detailed breakdown of physician participation in all stages of the interview process is provided below:

	Program Attendees (66)	Controls (45)
Contacted	63	42
Agreed to interview	58	32
Interviewed–pre	57	30
Usable protocols–pre	56	27
Interviewed–post	53	21
Usable protocols–post	53	21

Length of the post-program interviews ranged from seven to 30 minutes, with a mean of 17 minutes.

Length of time between pre and post interviews ranged from 60 to 134 days for participants (mean = 95.00, standard deviation = 16.95); 70 to 112 days for controls (mean = 91.5, standard deviation = 12.67).

K. *Organization of data*

As in the first year of the study, the interview was deliberately constructed in an open-ended fashion, in order to exploit the advantages of physician-to-physician dialogue and to minimize the risk of asking "leading" questions. Thus, complete response categories were not identified in most cases until response patterns had been observed. The coding process proceeded as follows. Preliminary categories were determined *a priori* by project staff, based upon suppositions about existing practice patterns. For example, Item 7 in the protocol (pre-program) asked physicians how they decided which patients would have a stress test. We predicted that the two most common responses would be "standard for good prognosis" and "complicated cases." Preliminary review of the data revealed other categories. A draft coding form was then developed and employed with each completed protocol. Each protocol was coded independently by two staff members; noncodable responses

were marked "other," and flagged for entry (word for word) into the computer. All discrepencies between the independent codings were resolved by the entire project staff. All coded data were entered into a computer file, and a printout of the raw data was matched for accuracy with the individual protocols. All "other" responses were grouped, item by item; additional codes were assigned whenever the "other" code contained five or more essentially similar responses. The raw data file was then edited to reflect coding changes.

Case studies were constructed for all study participants, thus allowing for an examination of the full range of program impact on individual physicians. Pre-post pairs of protocols were divided among the five project staff, and draft cases were reviewed for comparability.

Second-year findings

Results are presented as follows:
A. Characteristics of participants;
B. Comparison of pre-program interview with program pretest;
C. Pre-post responses: risk stratification at discharge;
D. Pre-post responses: education strategies for the coronary patient;
E. Identified impacts of the Heart House program on physician knowledge, attitudes, and practice behaviors;
F. Case summaries

A. *Characteristics of participants*

As Table 24 indicates, attendees were similar to controls in distribution across specialty type and practice setting.

Table 24

Practice Characteristics:
Attendees and Controls

SPECIALTY

	Cardiology	Internal Med./ Cardiology	Internal Medicine	Other	TOTAL
Controls	12	3	4	2	21
Attendees	22	12	12	7	53
	34	15	16	9	74

$\chi^2 = 1.58$; NS

SETTING

	Solo Practice	Group Practice	University Based	Other	TOTAL
Controls	6	14	0	1	21
Attendees	17	25	4	7	53
	23	39	4	8	74

$\chi^2 = 3.72$; NS

Sixty-four percent of attendees, and 71% of controls, had practices emphasizing cardiology. Seventy-nine percent of attendees practiced in either an

individual or group setting, compared to nearly all of the controls. The two groups were not statistically different in either specialty or practice setting.

B. *Comparison of pre-program interview with program pretest*

Three questions on the program pretest were essentially the same as those asked during the interview. They are reproduced below:

"For patients you see with acute myocardial infarction, how frequently do you use each of the following tests around the time of discharge to identify those at high risk for recurrent infarct or sudden death?

"6. Exercise test
"7. Exercise radionuclide
"8. Cardiac catheterization/angiogram"

For each procedure respondents were given a five-point response scale:

"a. Almost never
"b. Occasionally
"c. About half the time
"d. Often
"e. Almost always"

This information was collected in a more open-ended way during the interview: respondents were asked about how many patients they discharged in a typical month, then about how many patients in this group had each of the above procedures. Responses were then coded into frequency categories, using the following criteria:

1. "Almost never"—0 to 9%
2. "Occasionally"—10 to 44%
3. "About half the time"—45 to 54%
4. "Often"—55 to 84%
5. "Almost always"—85 to 100%

Table 25 displays comparisons of interview and pretest responses for frequency of use of exercise stress tests, exercise radionuclide, and cardiac catheterization/angiography, respectively. Numbers in the diagonals of the tables (**boldface**) represent physicians who gave the same response both times. (Some attendees did not respond to pretest questions, thus the smaller total.)

For the question on exercise tests, 55% of attendees gave the same response on both occasions, while 26% gave responses differing by one category (e.g., "occasionally," vs. "about half the time"). Similar findings obtained from the other two questions: 63% and 30% for exercise radionuclide, and 60% and 28% for cardiac catheterization. In none of the three cases, however, was the observed relationship large enough to be statistically significant. Visual inspection of the data reveals that discrepancies between the two reported frequencies occurred much more often—by a margin of almost two to one—*above* the diagonal. That is, there was a tendency among attendees to report using these procedures more frequently in the pretest than in the preprogram interview. In fact, four physicians (not included in the table) who had reported discharging no MI patients *at all* in the interview indicated in the pretest that they used one or more of these procedures at least "occasionally" on MI patients at discharge. These findings run counter to most accepted psychological theories on "social desirability," which would predict that a positive response bias would be more likely to occur during an interview than when the respondent is anonymous at a console.

Table 25

Comparison of Interview with Pretest Responses: Frequency of Use of Three Tests

EXERCISE TEST

Interview	Pretest: Almost Never	Occasionally	About ½ time	Often	Almost Always	Total
Almost Never	**5**	2	0	0	1	8
Occasionally	0	**6**	3	1	2	12
About ½ Time	1	0	**1**	1	1	4
Often	0	0	0	**4**	4	8
Almost Always	1	0	2	2	**10**	15
TOTAL	7	8	6	8	18	47

Weighted Kappa* = .55; NS

EXERCISE RADIONUCLIDE

Interview	Pretest: Almost Never	Occasionally	About ½ time	Often	Almost Always	Total
Almost Never	**23**	8	0	2	0	33
Occasionally	2	**6**	1	0	1	10
About ½ Time	0	0	**0**	0	0	0
Often	1	0	0	**0**	0	1
Almost Always	0	0	2	0	**0**	2
TOTAL	26	14	3	2	1	46

Weighted Kappa* = .30; NS

CARDIAC CATH/ANGIO

Interview	Pretest: Almost Never	Occasionally	About ½ time	Often	Almost Always	Total
Almost Never	**12**	5	1	0	0	18
Occasionally	2	**16**	3	0	0	21
About ½ Time	4	3	**0**	0	0	7
Often	0	1	0	**0**	0	1
Almost Always	0	0	0	0	**0**	0
TOTAL	18	25	4	0	0	47

Weighted Kappa* = .25; NS

*The weighted Kappa statistic measures the agreement between ordinal categorical variables; in this case, responses to two similar frequency scales at two different times. Values of Kappa may range from −1 ("perfect disagreement") to 0 (no relationship) to +1 ("perfect agreement"). In essence, weighted Kappa is a measure of the degree to which physicians gave the same response on both occasions. Observations on the diagonal receive the maximum weight, with the weights decreasing as the size of the disagreement increases (a sort of "partial credit" for "near misses"). In general, values of weighted Kappa above .75 are interpreted as "excellent" agreement, while values under .40 are regarded as "poor." (Source: Fleiss, 1981.)

C. *Objective 1: risk stratification at discharge*

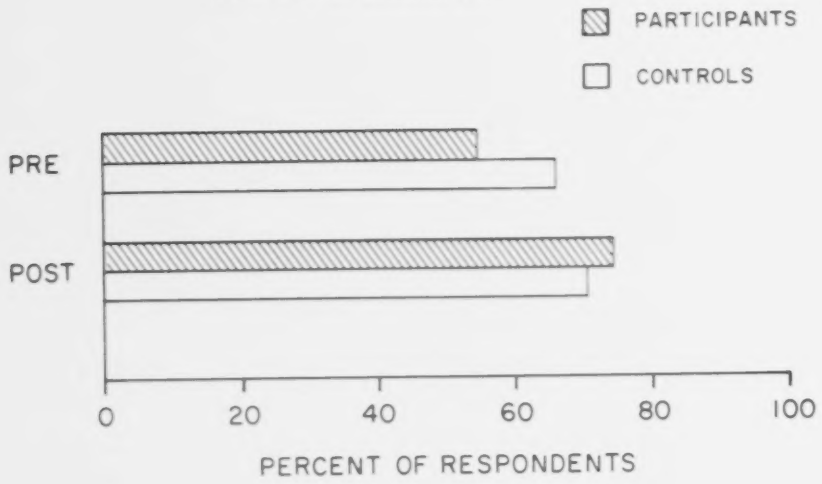
Objective 1, as assessed in the protocol, was for physicians *to obtain an exercise test, or alternatively an exercise radionuclide or cardiac catheterization, before discharge or within two weeks thereafter, on all patients with myocardial infarction having a good prognosis.* Data pertinent to this objective will be presented as follows: numbers of attendee and control physicians meeting this criterion, pre and post program; frequency of use, decision criteria employed, and information sought from each of the above three tests; the use of other stratification procedures; and non-clinical factors affecting the use of these tests.

1. *Physicians at criterion, pre and post program*

Physicians were judged to be "at criterion" if they employed one or more of the three procedures routinely for MI patients having a good prognosis. In order to check the accuracy of staff coding, uncoded copies of the first 40 pre-program protocols were sent to the course director for an independent judgment. Her indication of which protocols met the criterion matched our judgment in all cases.

Figure 10 shows the percentage of attendees and controls meeting Objective 1, pre and post program. Controls slightly outperformed attendees in the pre-program interview, by 67% to 55%. Attendee performance improved in the post-program interview, to 75%, while controls stayed virtually the same (71%).

Figure 10
PERCENT OF RESPONDENTS MEETING OBJECTIVE I (1985): Routine Use of Risk Stratification Methods at Discharge.



In Table 26 the significance of pre-post change is tested separately for attendees and controls. Totals have been reduced by those physicians in both groups who do not discharge MI patients.

Table 26

Physicians at Criterion:
Pre vs. Post Program

ATTENDEES

		Post Program		
		Not at Criterion	At Criterion	Total
Pre Program	Not at Criterion	7	11	18
	At Criterion	0	29	29
	Total	7	40	47

$\chi^{2*} = 9.01$, $p < .01$

CONTROLS

		Post Program		
		Not at Criterion	At Criterion	Total
Pre Program	Not at Criterion	4	2	6
	At Criterion	1	3	14
	Total	5	15	20

$\chi^2 = .33$; NS

The number of attendees meeting Objective 1 changed significantly pre-post program, the number of controls did not.

Table 27 briefly profiles each of the 18 attendee physicians who did not meet the criterion pre-program. They are grouped according to the 11 who apparently changed to criterion performance by the time of the post program interview, and the 7 who did not.

Table 27

Attendee Profiles: not at criterion pre-program

Change to criterion

Setting	*Change(s)*	*Reason(s)*
Internist-group—small city without cardiologist	Exercise test from 50% to routine	Course established prognostic value
Internist—only one in small town	Exercise test from <50% to routine	More comfortable with safety due to course
Cardiologist—multispecialty group—urban	Exercise test from 0% to routine; less reliance on cath	Course established prognostic value; less aggressive with CABG
Noninvasive cardiologist—multispecialty group—urban	Exercise test from <50% to routine; more exercise nuclide	Recent literature
Cardiologist—group—new practice—small city	Exercise test from <50% to routine	Not given
Internal medicine/cardiology—solo—university affiliation	Earlier use of exercise test; now routine	Course information
Internal medicine/cardiology—solo—small town	Earlier use of exercise test; now routine	National trends; course; literature
Cardiologist—group—suburban—to supervise new hospital rehab program	Exercise test from rarely to routine	More comfortable with safety due to course
Internal medicine/cardiology—solo—suburban	Exercise test from occasionally to routine	More comfortable with safety due to course
Cardiologist—group—urban	Exercise test now for those with small MI; routine	Course; literature
Internist—group—small city	Earlier and more extensive use of exercise tests; more cardiac cath	Course; improved ability to intervene with surgery or angioplasty

No Change to Criterion

Setting	*Factor(s)*
Cardiologist—group—urban area	Relies on evaluation of symptoms and physical exam; cath for high risk; feels exercise test costly and not helpful.
Cardiologist—CCU/stepdown unit director—university affiliation—suburban	Relies on walking patients with analysis of pulse response, Holter monitor; some increase in exercise tests after course, to 10–15%; feels exercise lab would be overloaded with more.
Internal medicine/cardiology—solo—small city	Relies on ambulatory ECG; concerned about safety of exercise tests, although some increase due to course (to 20%).
Internist—solo—small city	No exercise test or cardiac cath facilities available; will obtain treadmill for hospital as result of course.
Director of internal medicine in community hospital—solo—urban	Relies on clinical course, ambulatory ECG, and echo; refers patients needing further stratification to those who can intervene.
Cardiologist—invasive—group—urban	Relies on cardiac cath, sometimes with exercise test, but not until 6 weeks if asymptomatic; some increase in use of exercise test, from 25–50%, due to course.

The "change" and "no change" groups were similarly distributed across settings and practice characteristics. However, most of the physicians who changed were in group rather than solo practice; conversely, most of those who did not change were in solo practice.

The pattern of practice for physicians who changed to meet the criterion is clear: all now employ exercise stress tests routinely for patients with a good prognosis; and three of the eleven now employ the exercise test at or around the time of discharge, whereas before the program they had delayed the test until several weeks *after* discharge. One physician indicated less reliance now on cardiac cath; one indicated *more* reliance on cath; and one indicated using exercise radionuclide more often. Nine of the eleven physicians attributed the change(s) they made at least partly to the Heart House course (one cited "recent literature" only; one did not say). Of those who mentioned Heart House, three mentioned specifically that the course made them more comfortable with the safety of the procedure, and two said that the course established the prognostic value of the test. One physician cited his hospital's recent acquisition of treadmill equipment as the major factor, although the course also had some influence on his risk stratification procedures.

It is helpful to contrast the profiles of these physicians with the profiles of the seven physicians who did *not* change their practice behavior to meet the criterion. All those who did not change continued to rely on the patient's clinical course and/or an ambulatory ECG as primary means of risk stratification. Two of the seven, both in less-populated areas, had no exercise test or cardiac cath facilities available to them in their hospitals, although one stated that he intended to push for acquisition as a result of the Heart House course. One physician, an internist, tended to refer patients needing stratification to specialists. Each of the remaining four physicians had different reasons for not stratifying risk with exercise tests at discharge. One felt that such procedures were not cost-effective; one felt that the exercise lab would become "overloaded" with greater use; one continued to be concerned about safety of the procedures; and one, an invasive cardiologist, continued to rely on cardiac cath at discharge for symptomatic patients only. Interestingly, three of these four physicians *did* indicate greater use of exercise tests following the course. Thus, of the seven "no change" physicians, four did express an actual or intended change in practice behavior, in a criterion-related direction. Only two physicians having an apparent opportunity to change indicated no change at all.

2. *Use of exercise stress test*

Reported frequency of use of the exercise test, pre and post program, is displayed in Table 28.

Table 28

Frequency Codes for Exercise Test
Pre vs. Post Program

ATTENDEES

Pre Program	Post Program: Not done Unavail.	Almost Never	Occa-sionally	About ½ time	Often	Almost Always	TOTAL
Not done Unavail	2	1	2	0	0	1	6
Almost Never	0	0	1	0	1	1	3
Occa-sionally	0	1	2	3	1	5	12
About ½ Time	0	0	0	1	3	1	5
Often	0	0	1	0	2	3	6
Almost Always	0	0	0	0	2	12	14
TOTAL	2	2	6	4	9	23	46

$Q^* = 13.85$; $p < .05$

CONTROLS

Pre Program	Post Program: Not done Unavail.	Almost Never	Occa-sionally	About ½ time	Often	Almost Always	TOTAL
Not done Unavail	1	0	0	0	0	0	1
Almost Never	1	1	0	0	0	1	3
Occa-sionally	0	2	0	0	2	0	4
About ½ Time	0	0	0	1	1	0	2
Often	0	0	1	0	1	1	3
Almost Always	0	0	0	1	1	5	7
TOTAL	2	3	1	2	5	7	20

$Q^* = 2.82$; NS

*Q refers to the Stuart-Maxwell statistic, a test of independence of assignment to categories. A significant Q indicates that classification to physicians into frequency codes differs significantly between the pre and post interview. *Source*: Maxwell, 1970.

Table 28 indicates that program attendees used an exercise test within two weeks of discharge significantly more frequently after the program than before. Forty-one percent of attendees were classified in the same frequency range pre and post program; 50% used the exercise test more frequently; and 9% used it less frequently post program. Controls exhibited no significant change.

Figure 11
EXERCISE TESTS: Criteria for Ordering

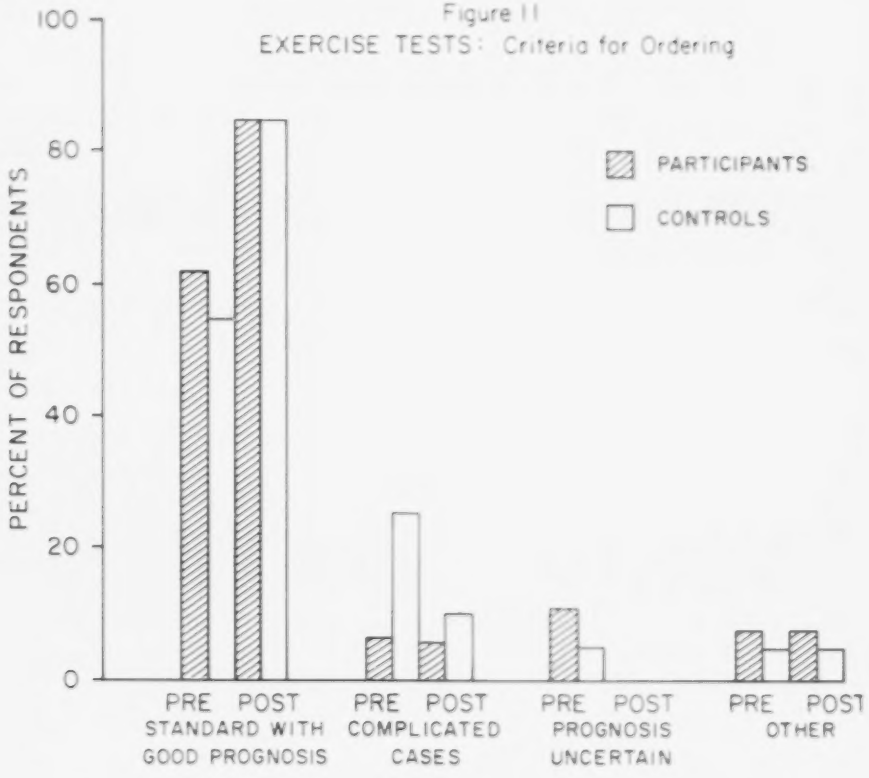
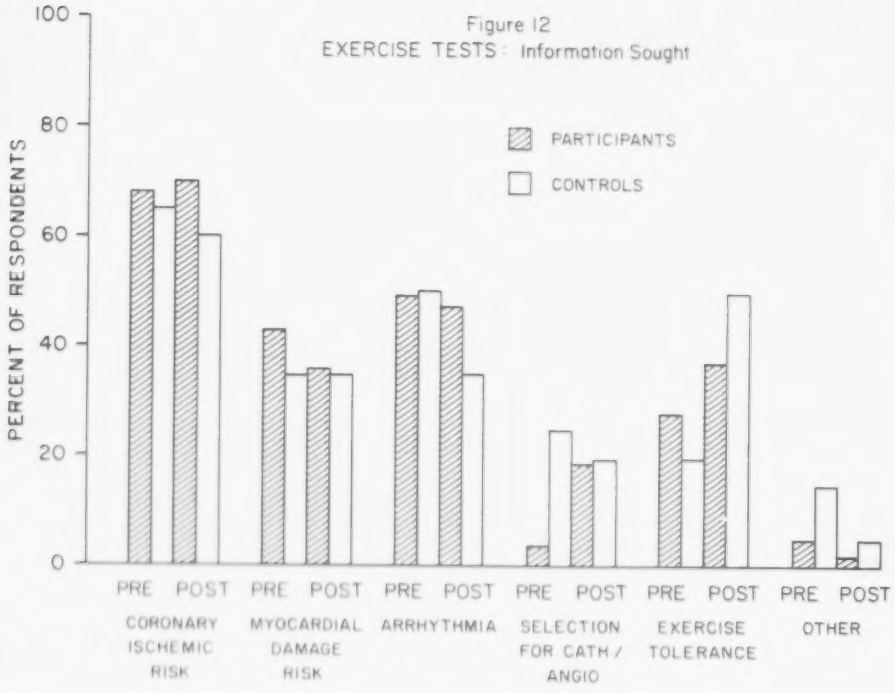


Figure 11 displays the decision criteria physicians used in ordering an exercise test. The "correct" response category is "standard with good prognosis": it includes such specific responses as "all who can perform," "all except elderly or infirm," and "patients doing well." The other two response categories are "complicated cases" and "prognosis uncertain." The former category includes such specific answers as "arrhythmia" and "persistent pain." The "other" category includes miscellaneous responses (e.g., "if requested by patient or referring physician"). The "standard with good prognosis" response was by far the most common, given by 62% of attendees and 55% of controls pre-program, and 85% of both groups post program. The percentage shift was statistically significant for both groups (attendees: $\chi^2 = 5.88$, $p < .05$; controls $\chi^2 = 8.33$, $p < .05$). Since both attendees *and* controls increased the relative frequency of this response, the upward shift by the attendee group may not be attributed to program effects. Answers falling into the other response categories were relatively infrequent by both groups.

Figure 12 indicates the distribution of responses to the question of what clinical information physicians were looking for with the exercise test. "Coronary/ischemic risk" includes such responses as "ST depression," "angina," and "left main disease." "Myocardial damage risk" includes such responses as "pulse," "hypotension," and "congestive heart failure." "Arrhythmia" includes "PVC's," "ventricular ectopy," and "frequency of rhythms." The categories "Selection for cath" and "Exercise tolerance" are self-explanatory. The "Other" category includes miscellaneous responses such as "cyanosis" or "unusual dyspnea."



Visual inspection of Figure 12 reveals very little apparent change pre-post program by either group. About 6 in 10 physicans used the exercise test at discharge to look for evidence of coronary or ischemic risk, about 4 in 10 looked for evidence of myocardial damage, and about 2 in 10 used the procedure to select patients for cardiac cath or angiography.

Taken together, Figures 11 and 12 suggest that the increased frequency of the exercise test is traceable to a shift in patient selection criteria, with more physicians using the exercise test routinely post-program for patients with a good prognosis. While this change may not be attributed solely to program effects, it does help explain the significantly increased use of the exercise test by attendees. The nature of information sought from the test appears to have remained relatively constant, however.

3. *Use of exercise radionuclide*

Pre and post program frequency codes for the use of exercise radionuclide are given in Table 29. This test is used infrequently or not at all by most physicians in both groups, and no significant change in frequency was found in either group, pre vs. post program. Because the test is used so infrequently, breakdowns of clinical criteria employed and information sought have little meaning; but of the ten attendee physicians who indicated using exercise radionuclide at least occasionally in the post-program interview, eight did so if the exercise test was equivocal, five used it with complicated cases, and only three considered it a standard procedure for patients with a good prognosis. All of the ten used the procedure to evaluate myocardial damage risk, and five looked for coronary/ischemic risk. Similar profiles were found in the control group.

Table 29

Frequency Codes for Exercise Radionuclide
Pre vs. Post Program

ATTENDEES

Pre Program	Post Program: Not used/ Unavail.	Almost Never	Occa-sionally	Often	Almost Always	TOTAL
Not used/ Unavail.	19	7	3	0	0	29
Almost Never	2	5	2	0	0	9
Occa-sionally	3	1	2	1	0	7
Often	0	0	0	1	0	1
Almost Always	1	0	0	0	1	2
TOTAL	25	13	7	2	1	48

Q = 2.82, NS

CONTROLS

Pre Program	Post Program: Not used/ Unavail.	Almost Never	Occa-sionally	About ½ time	Often	TOTAL
Not used/ Unavail.	4	5	1	0	1	11
Almost Never	0	1	0	0	0	1
Occa-sionally	1	1	2	0	0	4
About ½ Time	1	1	1	1	0	4
Often	0	0	0	0	1	1
TOTAL	6	8	4	1	2	21

Q = 7.42, NS

4. *Use of cardiac catheterization/angiography*

Frequency codes for cardiac cath/angio are given in Table 30. The modal response category for both attendees and controls was "occasionally." Neither group changed significantly between the two interviews. This was expected, as use of cardiac cath was not covered at all in the program. Of the thirty attendees who indicated using this procedure at least occasionally in the post-program interview, the most common decision criterion was "angina or ischemia" (80%), followed by "poor stress test results" (73%), "complicated cases" (47%), and "standard with good prognosis" (27%). Similar breakdowns were obtained in the control group. Most commonly, these 30 physicians used cardiac cath to "select patients for surgery" (90%), followed by "assess coronary/ischemic risk" (43%) and "assess myocardial damage risk" (23%). Again, similar patterns were observed in the control group.

Table 30

Frequency Codes for Cardiac Cath/Angio
Pre vs. Post Program

ATTENDEES

Pre Program \ Post Program	Not used Unavail	Almost Never	Occasionally	About ½ time	Often	Almost Always	TOTAL
Not used Unavail	4	2	4	0	0	0	10
Almost Never	2	7	5	0	0	0	14
Occasionally	1	2	13	1	0	1	18
About ½ Time	0	0	2	3	0	0	5
Often	0	0	0	0	1	0	1
TOTAL	7	11	24	4	1	1	48

Q = 3.73, NS

CONTROLS

Pre Program \ Post Program	Not used Unavail	Almost Never	Occasionally	About ½ time	Often	TOTAL
Not used Unavail	0	2	1	0	0	3
Almost Never	1	0	2	0	0	3
Occasionally	0	0	5	0	0	5
About ½ Time	0	0	3	1	1	5
Often	0	1	1	1	1	4
Almost Always	0	1	0	0	0	1
TOTAL	1	4	12	2	2	21

Q = 7.82, NS

5. *Other stratification procedures*

Information on three other tests—resting radionuclide, ambulatory EKG, and echocardiography—was recorded if volunteered by the respondent. For the purposes of Objective 1, use of these procedures was considered ancillary, as they were not considered by the course director and her faculty to be adequate for stratifying risk for recurrent infarct or sudden death. Percentages of physicians indicating use of these procedures pre and post program are given in Table 31.

As is readily apparent, the percentages of attendees who employed these three procedures remained stable between the pre and post interview: one of three used resting radionuclide, two of three used ambulatory EKG, and two of five used echocardiography. Percentages of control physicians volunteering use of ambulatory EKG and echo dropped between the pre and post interview.

Table 31

Use of Resting Radionuclide, Ambulatory EKG, and Echocardiography
Pre vs. Post Program
(by percent of respondents)

		Resting Radionuclide	Ambul. EKG	Echo
Pre Program	Attendees	34	62	40
	Controls	24	76	48
Post Program	Attendees	34	66	40
	Controls	29	57	24

6. *Factors affecting stratification procedures*

Respondents in both interviews were asked to list nonclinical factors that influenced their use of risk stratification procedures. Response patterns on the two occasions were quite similar; post-program responses are given in Table 32. Nearly half of both attendees and controls indicated that no nonclinical factors affect their use of risk stratification methods. The most frequently mentioned factor was "lack of availability," split almost evenly between exercise radionuclide and cardiac cath. Under "cost," the most frequent comment was difficulty obtaining third-party payments for procedures. The impact of DRGs is apparently not as great as some may have anticipated; this factor was mentioned by only five attendees and no controls. Other factors mentioned included delays in getting the tests done, patient compliance, poor quality of tests, and "defensive medicine."

Table 32

Factors Influencing Stratification
(Post Program)

	Attendees		Controls	
Factor	n	%	n	%
Availability of facilities	13	25	6	29
Cost	5	9	5	24
DRGs	5	9	0	0
Waiting time	2	4	0	0
Other	4	8	1	5
None	24	45	10	48

7. *Perceived practice changes*

In the post-program interview, following the discussion of risk stratification procedures, respondents in both groups were asked directly whether they had changed the frequency with which they obtained exercise tests, exercise radionuclide, and cardiac cath, since January (pre program). Responses are displayed in Table 33.

Table 33

Perceived Change in Ordering Frequency*

Exercise Test

	No Change	Order More	TOTAL
Attendees	23	22	45
Controls	18	3	21
	49	25	66

$\chi^2 = 7.29$; $p < .01$

Exercise Radionuclide

	No Change	Order More	Order Fewer	TOTAL
Attendees	28	5	3	36
Controls	18	1	0	19
	46	6	3	55

$\chi^2 = 2.86$; NS

Cardiac Cath

	No Change	Order More	Order Fewer	TOTAL
Attendees	39	4	2	45
Controls	18	3	0	21
	57	7	2	66

$\chi^2 = 1.80$; NS

*Marginal totals have been reduced by those who have no pre-discharge facilities available

Nearly half of attendee respondents indicated that they had increased their use of exercise tests since the program, compared to less than 15% of the controls. This difference is statistically significant. In contrast, few respondents in either group indicated change in use of exercise radionuclide and cardiac cath/angiography. Overall, 60% of attendee respondents to this question indicated change in *at least one* of the three procedures, compared to 24% of the controls.

Those respondents who did mention a change in any of the three procedures were asked, "To what do you attribute this change?" Responses were characterized in Table 34.

Table 34

Source of Change in Frequency

	Attendees		Controls	
	n	%*	n	%*
"More convinced of usefulness"	6	22	0	0
"Literature"	5	19	3	60
"Heart House course"	13	48	—	—
Other	7	30	3	60

*of those indicating change (27 attendees, 5 controls)

For attendees, the most commonly-mentioned source of change was the Heart House course (48% of those indicating change). Some of those who said they were "more convinced of usefulness" *may* have been referring also to the Heart House course. About one in five mentioned "literature" as a contributing factor. Other comments included clinical variables (e.g., "more nuclear test because more equivocal treadmills"), the ACC annual meeting, changes in hospital policies, and general comments (e.g., "conveying information to partners").

Of the 13 attendees who specifically mentioned the Heart House course as a factor, all had earlier indicated an increase in exercise tests; two had indicated an increase in exercise radionuclide, one had indicated a decrease in use of that test, and three had indicated an increase in use of cardiac cath.

8. *Summary*

a. The percentage of attendees meeting Objective 1 increased significantly pre-post program, from 55% to 75%. Control physician performance remained relatively constant, from 67% to 71%, pre-post program.

b. Of the 18 attendee physicians discharging MI patients who were not at criterion performance pre program, eleven changed their practices to meet the criterion post program, while seven did not. Analysis of the eleven attendees who changed revealed that these physicians were more likely to be in group (vs. solo) practices; all now used exercise tests at or around the time of discharge, and nine attributed the change to Heart House, citing most often greater comfort with or confidence in the procedure. Of the seven attendees

who did not change, two did not have the proper facilities available; four expressed at least an *intent* to change, in a criterion-related direction.

c. Attendees significantly increased their use of exercise tests pre-post program; controls did not. Neither group significantly increased use of exercise radionuclide (employed relatively infrequently) or cardiac cath.

d. Significantly more attendees *and* controls in the post-program interview mentioned "standard with good prognosis" as a decision criterion for use of the exercise test. Information sought from this procedure did not change for either group. Neither decision criteria nor information sought changed for exercise radionuclide and cardiac cath.

e. About half of the respondents in both groups indicated non-clinical factors affecting their use of these tests; the most frequent factor mentioned was "availability of facilities."

f. When asked directly whether they had changed how frequently they used these risk stratification procedures, 60% of attendees indicated change in at least one of them, compared to 24% of controls. About half of the attendees indicating change volunteered the Heart House course as a factor.

D. *Pre-Post responses: education strategies for the coronary patient*

The next part of the interview protocol focused on *Program Objective 2: to employ a formal education program for coronary patients post-discharge, focusing on modification of specific risk factors.* This was assessed in both pre and post protocols by asking respondents what they did to inform patients about conventional coronary risk factors, noting specific factors mentioned; how they followed up on their recommendations; and what they would like to do to *enhance* education for their patients.

1. *Physicians meeting Objective 2, pre-post program*

Taking the objective literally, we found that *all* respondents in both attendee and control groups were already "at criterion" for this objective, pre program. Staff judgments were confirmed by the course director in her review of the first 40 pre-program protocols.

2. *Source(s) of education*

Table 35 summarizes the sources of education listed by respondents for coronary patients, around the time of discharge or during the first follow-up visits.

Table 35

Source of Education for
Coronary Patients,
Pre and Post Program
(by percent of respondents)

	PRE-PROGRAM		POST-PROGRAM	
	Attendees (n = 53)	Controls (n = 21)	Attendees	Controls
Respondent physician	58	43	70	62
Another physician	8	10	6	5
Office staff	9	5	8	5
Hospital staff	57	62	70	67
Rehab. program	28	48	34	43
Other	4	0	0	5

Note: Percentages add to more than 100% due to multiple responses.

Attendees and controls show similar patterns, both pre and post program. More than half indicated that they counseled patients on risk factors themselves, and approximately equal numbers indicated counseling done by hospital staff (most often, by nurses in step-down units, or dieticians). Smaller percentages listed rehabilitation programs. Of interest would be evidence that larger numbers of attendees counseled patients themselves post-program, thus indicating perhaps a greater personal commitment to patient education. This, however, was not strongly supported by the data. Thirty-one attendees (58%) indicated in the pre-program interview that they counseled patients themselves; thirty-seven (70%) said so in the post-program interview. There was a slight tendency for more attendees to provide education personally than controls, and for more controls to rely on a rehabilitation program. This pattern was the same, however, pre *and* post program.

3. *Risk factors covered in education*

Table 36 shows percentages of respondents who mentioned certain specific risk factors as part of their patient education program. Smoking and hypertension were discussed little if at all in the course; exercise and weight control were touched upon briefly; and lipid control and stress were covered in some detail.

Smoking and hypertension showed little change by attendees, pre vs. post program. Mention of exercise and weight control both increased pre-post program, although the latter also increased in the control group. Stress was mentioned with approximately equal frequency in both interviews by the attendee group.

Table 36

Risk Factors Mentioned
as Part of Patient Education,
Pre and Post Program
(by percent of respondents)

	PRE-PROGRAM		POST-PROGRAM	
	Attendees (n = 53)	Controls (n = 21)	Attendees	Controls
Smoking	89	71	92	95
Hypertension	63	67	55	62
Exercise	34	60	55	62
Weight Control	49	29	78	52
Lipid Control	77	76	94	81
Stress	25	19	27	38

Table 37

Methods Used to Follow
Up on Patient Education,
Pre and Post Program
(by percent of respondents)

	PRE-PROGRAM		POST-PROGRAM	
	Attendees (n = 53)	Controls (n = 21)	Attendees	Controls
Done by others	28	29	23	48
Office visits (NOS)	26	33	25	19
Check risk factors	32	43	55	38
Question patient	25	29	36	19
Repeat exercise test	15	0	9	5
Other	11	10	9	9

4. *Followup Strategies*

Methods used by respondents to follow up their recommendations to patients are summarized in Table 37.

Response categories were defined as follows. "Done by others" refers to follow-up done by someone (e.g., rehab physician) other than the respondent. "Office visits (not otherwise specified)" includes all responses wherein the respondent indicated simply that patients were followed by him or her, without elaboration. Specific follow-up procedures—"Check risk factors (e.g., blood pressure, cholesterol), "question patient" (e.g., about lifestyle changes), and "repeat exercise test," were all coded when mentioned. "Other" responses included such activities as "meet with spouse" and "meet with patient groups." Relative frequency of responses remained fairly stable pre-post program; the only change was an increase in those attendees who mentioned checking specific risk factors, from 32% to 55%.

It may be hypothesized that evidence of program impact could be found by looking for an increase in percentage of attendees who mentioned at least one specific follow-up procedure. This figure showed no change, however: 77% to 79% for attendees (vs. 90% to 71% for controls), pre-post program.

5. *Desired enhancements to patient education*

Respondents were asked how they would like to enhance education for their coronary patients. Conceivably, significant program impacts could influence attendees' *intent* to change education strategies. Pre-post responses are given in Table 38.

Table 38

Desired Enhancements to
Patient Education,
Pre vs. Post Program
(by percent of respondents)

	PRE-PROGRAM		POST-PROGRAM	
	Attendees (n = 53)	Controls (n = 21)	Attendees (n = 53)	Controls (n = 21)
No change desired	15	10	19	10
Change desired (NOS)	9	0	2	14
Better primary prevention	11	14	4	10
Estab./Enlarge rehab prog.	26	24	25	19
More/Better teaching aids	11	14	28	5
Patient group sessions	15	29	11	10
More use of non-MDs	19	10	17	14
Better physician education	11	0	14	0
More time with patients	8	14	6	5
Other	6	24	9	24

The vast majority of respondents in both groups mentioned that they would like to do something differently. As Table 38 indicates, however, patterns of responses did not change much overall pre-post program, for either group. The most commonly-mentioned enhancements were to begin or expand a rehabilitation program (mentioned by about one in four attendees), to increase the use of ancillary personnel (such as physicians' assistants and nurse educators, mentioned by almost one in five), and to obtain more or better quality teaching aids (literature, audiovisual materials). The latter category was the only one showing an increase by either group pre-post program, from 11% to 28% of attendees. Most of the increase was due to interest specifically in audio-visual materials.

6. *Perceived changes in patient education methods*

In the post-program interview respondents in both groups were asked directly if their methods for informing coronary patients about conventional risk factors had changed since the time of their first interview. Responses are given in Table 39.

Table 39

Changes in Patient Education Methods?

	Yes	No	Total
Attendees	29	23	52
Controls	3	18	21
Total	32	41	73

$\chi^2 = 10.46$, $p = .001$

Fifty-six percent of attendees said their methods had changed, compared to 14% of the controls, and the difference was statistically significant.

Respondents who indicated change were asked to specify what the change was, and to attribute the source of the change. Responses to the former question are shown in Table 40.

Table 40

Nature of Change in
Patient Education
(by percent of those indicating change)

Attendees Only	Percent
More aggressive treatment of lipids, diet, cholesterol	69
More aggressive about exercise, rehabilitation	10
Other*	21

*Examples: "stress modification," "smoking," "group sessions," "young patients"

By far the change most commonly mentioned by attendees was content-oriented: more attention to lipids, diet, or cholesterol control. Other categories attracted only scattered responses. Of the three control physicians who indicated change, two specified lipid control, and two said they were using more drugs. (This latter response was not mentioned by any of the attendees.)

Twenty-two of the 29 attendees indicating change (76%) attributed the change to the Heart House course; and of this number, nine specifically mentioned a particular lecture as a major influence. Four attendees mentioned "literature" as a factor, and one said "a number of meetings." Of the three control physicians mentioning change, all cited literature as the primary source.

7. *Summary*

a. All respondents in both groups met the objective as stated, both pre and post program.

b. A majority of both attendees and controls counseled coronary patients themselves; approximately equal numbers provided education through the hospital staff. No changes were observed pre-post program.

c. Of a list of six specific risk factors covered in education programs, weight control increased significantly for both groups pre-post program; lipid control increased for the attendee group only.

d. Patient follow-up strategies remained fairly stable pre-post program, although the percentage of attendees who mentioned checking specific risk factors in follow-up visits increased.

e. While the vast majority of all respondents indicated ways they would like to enhance patient education, no one response dominated; and except for "improved teaching aids," none increased in frequency of mention by attendees pre-post program.

f. When asked directly in the post-program interview whether their patient education methods had changed, 56% of attendees said yes, compared to 14% of controls, a statistically-significant difference. Most often the change was in the area of lipid or diet control, and most respondents attributed the change to the Heart House course.

E. *Overall impact of the Heart House program on physician knowledge, attitude, and practice behavior*

After Objectives 1 and 2 had been covered, attendees were asked two questions focusing on the Heart House program itself: "*Other than those areas we've covered so far*, have you made, or will you make, any change in your practice as a result of attending the Heart House course in February?"; and, "How, if at all, did the Heart House program affect your *thinking* or *feeling* about rehabilitation of the coronary patient?"

1. *Other practice changes*

Nineteen attendees (36%) mentioned specific practice changes *other than* those already covered in Objectives 1 and 2. Of this number, ten said they were encouraging earlier or more aggressive rehabilitation for their patients as a consequence of the course. Sample comments were: "doing more with the patient having lower exercise tolerance"; "now writing a formal exercise prescription"; and "increasing physical activity of patients before discharge." Seven attendees said they were establishing or enlarging an exercise rehabilitation program. Other, single comments included: "obtaining a hospital

exercise test program"; "established a group program"; and "using a Holter monitor to evaluate anti-arrhythmic drug therapy."

2. *Changes in knowledge or attitude*

The question on perceived impacts of the Heart House program on the attendees' thinking or feeling about rehabilitation elicited a wide variety of responses, and all but one attendee gave one or more answers. They have been categorized in Table 41.

Table 41

Perceived Program Impacts on Knowledge or Attitude

	n	% attendees
New knowledge	4	8
Reinforced knowledge	3	6
Better attitude about value of rehabilitation	15	28
Reinforced prior attitude or practice	18	34
Reinforced importance of diet management	11	21
Other	2	4

A relatively small percentage of attendees volunteered knowledge impacts in terms of either new or reviewed information. Statements of effects on attitude were more frequent. About a third of the attendees felt the course reinforced what they were already doing: "more confident," "reinforced need to increase practice with regard to exercise tests." About a fourth indicated attitude change: "thinking about rehab for older patients"; "more interested in a formal cardiac rehab program." About a fifth specifically mentioned program impacts on their views of diet management.

F. *Case Studies*

Interview synopses of each study participant are given in Appendix H. While these are summaries only, and do not contain all of the information collected in the interviews, they do sketch the practice context, risk stratification and patient education methods, and for attendees, perceived impacts of the Heart House course.* As in 1983–84 these case studies reveal the diversity of practice patterns within this group of physicians and, accordingly, the diverse kinds of impact the course may have had. Cases are presented first for attendees, then controls. Each group has been divided into two clusters: those who appear to have made one or more practice changes between the first and second interview, and those who did not. For attendees, this latter group includes not only those for whom the Heart House course had no apparent impact at all (just one physician), but also those who cited strictly knowledge gain, attitude change or *reinforcement* of present beliefs and practices. Categorized in this fashion, 39 of 53 attendees (74%) were placed into the "practice change" group, as were 6 of 21 controls (29%).

In the pages that follow, four illustrative cases are presented, one per type per group.

1. *Attendee: practice change*

Dr. 48 is an internist in group practice with internists and cardiologists. He discharges about two patients per month with acute MI. Just before this phy-

*To preserve anonymity, masculine pronouns are used throughout the cases.

sician came to the course his hospital obtained an exercise treadmill. Prior to that time he would obtain an exercise test on all patients at about six weeks in the office. Now that he has the treadmill he intends to do pre-discharge exercise testing on all but elderly patients. Exercise radionuclide is not available in his hospital. About half of the MI patients have a cardiac cath: These have a complicated clinical course, persistent angina, or positive exercise test. Cath is usually done at six weeks in another city about three hours away. All patients prior to discharge have monitors in an ambulatory step-down unit, although there is no ambulatory EKG done. Thirty to fifty percent of his patients, those with anterior or large MI's, also have a 2-D echo. Besides the lack of availability of nuclide or cardiac cath, a non-clinical factor affecting the use of these tests is the patient's willingness to have the test done: this physician emphasized that he would not do a cath if the patient were unwilling to follow that up with surgery. Dr. 48 indicated that he is performing more exercise tests and more cardiac caths after the course. He attributed this change in part to the influence of the course, but also to an improved ability to intervene with angioplasty or surgery. Patient education takes place via a cardiac teaching program which consists of three one-hour sessions in the hospital emphasizing such risk factors as smoking, diet, stress, and exercise. Dietitians, occupational therapists and pharmacists are also used. Dr. 48 follows up on recommendations by checking blood cholesterol at six months, and questioning the patient about smoking and exercise at every visit. This physician would like to enhance education for his patients via a Phase II rehab program which the hospital has just recently initiated; he feels that a long term program at the YMCA would also be desirable as well as a "healthy heart club." His methods for informing patients about risk factors are different from what they were before the course: he is much more aggressive now about treatment of elevated cholesterol, and attributed this change to the course. He did not mention any other practice changes as a result of attending the program in February, but did mention three intangible benefits. First, he has a better understanding now of rehabilitation. Second, he is more interested in a formal cardiac rehab program. And third, he feels better about what he has been doing all along.

2. *Attendee: no practice change*

Dr. 33 is a non-invasive cardiologist in a group practice. Ninety-five percent of his practice is conducted in the hospital, and he does cardiac consults the other five percent of the time. He sees about twenty acute MI patients per month, both consults and referrals; none of them are his own. He usually sees them during the first half of their hospital stay, and signs off on them before discharge. All patients receive the exercise test unless they are elderly or have complications. Exercise radionuclide is not available in his hospital. Approximately twenty percent of his patients receive cardiac cath if they have positive stress test results or continued pain post MI. In these cases, he refers them to a tertiary hospital. Frequency of tests did not change between interviews. Dr. 33 participates in the patient's hospital and out-patient rehabilitation program. (He was the originator of the program, basing it on the course director's model.) He personally is involved in the patient's care and works with spouse and patient before discharge. He does not participate in patient follow-up, but is satisfied with his patient education program. As a result of attending the course in February, Dr. 33 feels more strongly that all post-hospital rehab patients should be monitored during exercise if at risk for ischemia.

3. *Control: practice change*

Dr. 90 is a full-time cardiologist in group practice, and sees about six patients with myocardial infarction in a typical month. His principal method for stratifying risk is cardiac cath, performed on about eighty percent of his patients. He feels that the exercise test is of limited value. Dr. 90 reported ordering more exercise radionuclides in the second interview, to determine the extent of the jeopardized myocardium. He cited recent research studies as the reason for change. His frequency of ordering exercise tests and cath has not changed. Dr. 90 uses the inpatient nursing service for patient education, as well as nurses in his office. He uses a rehabilitation program in his office to complement the nursing education. Dr. 90 is especially interested in stress management and control of blood pressure and lipid disorders. In the second interview Dr. 90 indicated that he has engaged in more discussion of cholesterol with patients, and uses more antiplatelet and antithrombin medication. He attributed this change also to sources in the literature.

4. *Control: no practice change*

Dr. 75 is a general internist, part of a 14-member group practice associated with a private community hospital. He discharges about one patient a month with MI, and attempts to get an exercise test prior to discharge on all those who can perform it. About 50% of his patients also have an exercise radionuclide if there are equivocal changes on the treadmill, or symptoms *despite* negative treadmill. Cardiac cath is typically not performed, as the nearest coronary angiography lab is an hour and a half away. An ambulatory EKG is also obtained on all patients with arrhythmia. Dr. 75 uses other clinical parameters to assess risk including family history, a lipid profile, and persistent hypertension. No changes were given in frequency of tests between the pre and post interview. Dr. 75 personally does patient education around the time of discharge. He reviews risk factors including smoking, hypertension, lipids, stress, weight reduction where appropriate, and symptoms characteristic of heart disease. Recommendations are followed up by regular office visits, when blood pressure, cholesterol, HDL, and triglycerides are measured. Dr. 75 would like to be able to spend more time with patients and their families, to "put the cigarette companies out of business," to possibly expand the local heart club for patient education, and to have more materials about diet and smoking cessation available. None of his methods for patient education had changed between the two interviews.

A. *Reliability and Validity Assessment*

As noted earlier, protocol reliability underwent significantly more scrutiny in the project's second year. The goal was, first, to arrive at a quantitative estimate of overall reliability, and second, to partition estimated error variance into three sources: interviewer, respondent, and coding. *Interview* error would occur when the interviewer did not accurately or completely capture the respondent's answer on the protocol form. *Respondent* error would occur if the respondent gave different answers (in either substance or detail) to the same question posed at two different times, even though practice characteristics or behaviors remained the same. *Coding* error would occur if essentially similar responses written on the protocol form were coded differently by project staff.

The analysis proceeded as follows. As in 1983–84, six ACC-member cardi-

ologists, none of whom would attend either the rehabilitation or the control program, were recruited as "test cases." Each physician was to be interviewed twice during the pre-program phase of the study, once each by a different member of the interview team. (Each interviewer thus interviewed two test cases.) Interviewers were not to know respondents' identities *as* test cases. In order to allow for the sort of analysis described above, arrangements were also made to have the test case physicians record each interview, using a special microphone attached to the telephone receiver. (All six interviewers consented to this procedure in advance, and an opinion was obtained from legal counsel to the ACC affirming its legality.) Transcripts were to be made of each interview, then compared for congruence with each other and with the written protocols. Unfortunately, sound quality was very poor on the audio tapes submitted by three of the six test cases, making preparation of transcripts impossible. Transcripts were prepared of the three other pairs of interviews, however. Test case protocols were coded by project staff together with other pre-program interviews, and then compared for congruence, item by item. Matches between codes (often multiple per item) on the separate protocols were counted as "agrees"; codes that appeared on one protocol and not the other were counted as "no agrees." ("No agrees" could thus reflect differences both in the substance and in the length or complexity of the response.) Percent agreement was then tabulated across both items and test cases, and served as the overall reliability index for the protocol.

Obtained reliability for the test cases is given in Table 42.

Table 42

Percent Agreement (Reliability)
for the Six Test Cases

Test Case	Total Responses	"Agrees"	% Agreement
* JH	41	27	63.4
JQ	47	22	46.8
* TD	34	30	85.3
TT	38	27	71.0
WB	42	31	73.8
* WF	38	30	79.0
TOTAL	240	167	69.6

*Transcript of interviews available

Overall reliability of the interview protocol as reflected in the six test cases was just under 70%. Reliability varied considerably among the test cases, ranging from a low of 46.8 (JQ) to a high of 85.3 (TD). Consistency also varied considerably across individual items, ranging from a low of 45.4% for

items 15 (criteria for selection of cardiac cath) and 44 (enhancement of patient education); to 100% for items 2 (practice setting), 5 (volunteered use of exercise test), 6.1 (frequency code for exercise test), 25 (criteria for use of echocardiography), and 35 (non-clinical factors affecting use of test). Reliabilities *by interviewer* were found to be (from lowest to highest), .56, .61, .72, .76, .76, and .79.

In order to identify the source of observed discrepancies, transcripts (available from test cases JH, TD, and WF) were analyzed to determine the number of discrepancies due respectively to interviewer, respondent, or coding "error." Of the 26 "no agrees" in these test cases, 12 (46%) were due to "interviewer error": the respondent had given substantially similar answers on both occasions, but the interviewers differed in their recording of the response. Eleven "no agrees" (42%) were found to be due to "respondent error": the respondent had given answers different in substance or detail on the two occasions. Finally, three "no agrees" (12%) were due to "coding error": both the answers given and the responses recorded on the protocols were essentially the same, but coded differently by the project team.

Extrapolating from these data, multiple coded responses to interview questions could be expected to be the same about 70% of the time between two independent administrations—a test-retest reliability coefficient of .83. Current data indicate that this figure is highly variable, depending upon both question specificity and interviewer skill.

B. *Face Validity*

1. *Review of interview data by project participants.* Once project staff had received the completed post-program interview, the summary page at the end was copied and mailed to the respondent, along with a copy of the pre-program interview summary. Respondents were asked to check the summaries for accuracy, make any corrections, and return them in a self-addressed, stamped envelope. They were also asked to comment on the reliability and accuracy of the interview method itself, as they perceived it. Twenty physicians chose to respond. Two of them added to or clarified the summaries; the other made no corrections. Eight saw fit to comment on the interview method. Their responses are reproduced below.

> Interviewers were friendly, professional, and seemed quite knowledgeable.

> Very lukewarm toward the accuracy of conveying the *total picture* in a short telephone interview.

> I was pleased to participate. Questions asked were somewhat difficult to answer, being relatively broad in scope.

> A good method of analyzing practice patterns.

> This method of assessment is pertinent.

> (The phone conversation) captured nuances of post myocardial care that ". . . must be individualized for each patient. Conversations were accurately reflected . . . and I hope this is indeed an effective method of evaluation.

> The "personal touch" of a telephone interview . . . makes the participant feel important . . . (and) the interviewer is able to get more precise data than would be obtained from a survey through the mail.

2. *Debriefing of physician interviewers.* As in the first year of the project, interviewers were asked to reflect on their experience and offer suggestions about how the process could be improved. Questions were asked about logistics, interview length and "flow," cooperation of respondents, perceived quality of information obtained, most positive and negative experiences, effects of the study on interviewers' own practices, and feasibility of the method.

a. *Logistics.* Interviewers agreed that in general they had an easier time scheduling and carrying out interviews in 1984–85. The difference was not perceived as due to greater secretarial skill or persistence, but rather greater interest by respondents in the study.

b. *Interview length and flow.* Interviewers agreed that the shorter protocol helped significantly. Organization of the protocol was seen as less tedious, less repetitious, and more pertinent. All felt quite comfortable with the protocol, particularly after the first two or three interviews had been completed.

c. *Cooperation of respondents.* The hardest part of the interview, as in 1983–84, was finding a time when both interviewer and respondent could talk. But once on the phone, most respondents were cooperative—even to the point of being enthusiastic and eager to share what they were doing. Interviewers speculated on possible reasons for respondent enthusiasm; some thought the "norm of conduct about rehab"—distinctive features about the interviewee group—could be responsible; others thought that greater comfort on their part may have helped. Cooperation did appear to be less enthusiastic in the post-program interview, when some physicians were less interested in covering the same material a second time. No differences in cooperation were observed between attendees and controls.

d. *Information quality.* In general, interviewers felt that respondents gave thoughtful answers to their questions. Of the two objectives, interviewers were more confident about answers to the first: all were comfortable that respondents gave them a clear idea of procedures they used to stratify risk; what was perhaps less clear was how physicians used the information to construct risk profiles. Respondents' answers about methods for patient education—Objective 2—were sometimes more ambiguous, and interviewers sometimes did not feel they (respondents) fully understood what was done. This was due in part to the large number of respondents who delegated most patient education responsibilities to others. Interviewers did perceive a significant impact of the course on diet intervention, using such terms as "spontaneous," "loud and clear," and "overwhelming." In other areas, interviewers sensed that the course generally reinforced respondents' current practice.

e. *Positive experiences.* Most of the interviewers felt that the most positive aspect of the study for them was to learn about patient care practiced by colleagues around the country. Two expressed surprise, for example, at the sophistication of other rehabilitation programs. To a person, interviewers seemed genuinely to enjoy the opportunity for interchange. Other positive characteristics noted were the effects of developing and implementing the interview protocol on their own thinking about rehabilitation of the coronary patient, and the interchange with other interviewers at Heart House training sessions.

f. *Negative experiences.* The most negative feature of the project was the time commitment required to carry out the interviews in already-busy practices. As one interviewer said, "the interviews were never relaxing. There were always time pressures."

g. *Practice change.* Most often, interviewers found that participation helped them rethink their own practice habits, and generally reinforced much of what they were already doing. One noted a more intensive emphasis on lipid management with his patients; one said he realized the weaknesses of his own rehabilitation program; and one was able to use the interview protocol to help develop goals for a continuing education program of his own.

h. *Feasibility of the method.* In general, interviewers were more sanguine about this method of evaluation as a result of their second year's experience. There was general agreement that interview protocols, carefully constructed, may produce valid and useful data; one interviewer said, "the only better way would be to follow people around." Interviewers made suggestions for making the method more practical: shorten interviews and use for a sample of programs; substitute a questionnaire for the pre-program interview; alert attendees in advance as to what interviews will cover; use a post interview only to allow for changes in program goals or emphasis.

C. *Content validity*

Content validity was significantly strengthened in Year 2. Both course objectives covered in the protocol were covered in depth throughout the course by program faculty; further, faculty recommendations were completely consistent with the language of the objectives themselves.

D. *Construct validity*

1. *Chart reviews*

Chart data were collected in the same general manner as in 1983–84. A questionnaire was designed to elicit specific information to be abstracted from patient charts. In that questionnaire (Appendix I), information was sought on the number of patients with acute myocardial infarction discharged by the responding physician during two intervals: the two-month interval immediately preceding the Heart House course, and the two-month interval immediately preceding the post-program interview. Respondents were asked to indicate for which of those patients an exercise test was performed before, or within two weeks of, discharge from the hospital. This information was used for comparison with respondents' reports of change in the interviews.

Implementation of the chart review phase during the first year of the study had resulted in two problems: some physicians had responded on the basis of a very small group of patients (less than 5), thus making any interpretation of "change" virtually meaningless; and only 18 usable questionnaires were received from the 25 physicians who had agreed to supply them, even though all had been paid $100 in advance for the work. Procedural modifications were undertaken in 1984–85 to correct these problems. First, chart reviews were requested only from attendees who had indicated discharging ten or more patients with MI during the preceding two months. Second, compensation for completing the survey was offered on the following basis: $50 downpayment and $5 per case when the survey was returned. Interviewers were also instructed to obtain the name of a clerical person in the physician's

office to whom the form would be sent, if at all possible.

Problems persisted, despite these measures. Only 20 attendees reported having discharged 10 or more MI patients within the two-month interval, and of these only 8 agreed to supply chart data. The criterion figure was then subsequently lowered to eight patients, and the five physicians who now were eligible were recontacted. Four agreed to supply the data, bringing the total to 12. We felt that this number was still unacceptably small, so a staff member contacted those physicians who had initially declined the chart survey. This increased the total surveyed to 20. Those who had not responded by August 1 were sent a reminder letter, and those who had not responded by August 23 were contacted by an ACC officer.

Ten usable questionnaires were eventually returned. Four physicians returned surveys without completing them; three of these said the task was too time consuming, one stated that he had not agreed to participate in the first place. Six physicians did not respond at all. Data given for the ten responding physicians are displayed in Table 43. Reported in the table are the physician's practice setting; ratios of exercise tests to discharged MI patients for two intervals (the two months preceding the Heart House program and the two months preceding the post interview); whether or not the physician had reported increasing the use of exercise tests; whether any problems with data collection were reported on the chart survey; and the identity of the individual completing the survey (the attendee himself or someone else).

Table 43

Chart Summaries

MD#	Practice Type	Exercise tests/patients		Change reported?	Problems?	Form
		Pre	Post			
10	Hospital	2/3	2/4	No		Other
03	Group	0/3	0/1	No	*	Other
15	Hospital	6/14	4/7	No		Other
16	Solo	0/1	0/0	No		Other
22	Univ.	0/0	0/7	Yes		Other
28	Group	0/15	1/21	No	**	Other
42	Univ.	1/9	0/13	No		Self
44	Group	3/5	2/6	Yes		Other
56	Group	7/10	1/7	Yes	***	Other
59	Group	4/5	6/15	Yes		Self

* Difficulty discriminating suspected vs. confirmed MI.
** Census incomplete; some charts missing.
*** Sometimes unclear which patients were discharged by Dr. 56.

The criterion for requesting chart surveys from attendees was an indication in the post-program interview that the respondent had discharged eight or more MI patients during the previous two months. However, only three of the completed surveys met this criterion; these small numbers, coupled with the low response rate, make the survey data difficult to interpret. Four of the ten attendees for whom chart data were available mentioned in the post-program interview that they had increased their use of exercise tests pre-post program. In no case was the assertion confirmed by the survey data.

Persons completing the chart summaries were asked to describe how they collected the data, problems they encountered, and how valid the data were. Most commmonly, a patient list was retrieved from the hospital's medical records department, matched against the name of the discharging physician, then cross-referenced against EKG records, both at the hospital and the doctor's office. In four cases, work was done by hand, using the inpatient census or billing sheets. Except as noted on Table 43, procedures employed posed no special problems. All survey respondents expressed confidence in the accuracy of the data, most indicating that the numbers had been checked and verified.

What, then, might account for the observed discrepancies between interviews and chart surveys, the low response rate notwithstanding? There are several possibilities.

a. Despite equivalent time intervals, the reference group used by attendees during the interviews may not have been the same as that used for the chart survey. Interview respondents may have included patients *officially* discharged by someone else. This would help explain the generally lower numbers of patients discharged in the chart survey. Patient numbers *are* comparable for the two physicians in the chart survey who completed the survey themselves (12 vs. 13; 10 vs. 15).

b. In the interview, respondents may have counted patients receiving exercise tests more than two weeks after discharge. Chart review respondents were held strictly to the two week post discharge deadline.

c. Chart reviews covered a two-month interval closely following the CME course. Behavioral changes made late in that interval would not be detectable.

d. Some interview respondents may have been expressing *behavioral intent* rather than *behavioral change*. For example, a survey respondent for one of the physicians who had indicated ordering more exercise tests (not confirmed in the charts) noted in an unsolicited comment that the physician had just recently made exercise tests routine in the practice—four months after the Heart House course, and more than two months after the post-program interview.

2. *Design or data collection problems*

Complete and usable interview data were obtained on 80% of program attendees, and 47% of controls. While the participation rate for the attendee group was very high, the corresponding rate for the controls was not. Thus, the question must be raised of whether the differential attrition in these groups might have biased comparisons made between them. Of the potential control group size of 45, 42 were contacted for participation, and 32 agreed to be interviewed. Of the ten physicians who refused, eight did so because they did not see patients regularly (they had research positions, or worked for drug companies). Twenty-seven usable pre-program protocols were obtained from the remaining 32 control group members; the rest indicated, either before the interview began or as it progressed that they treated coronary patients infrequently or not at all. Hence, most of the attrition in the control group to that point was due to inappropriate practice characteristics. Twenty-one of the remaining 27 controls were interviewed a second time; three declined a second interview, and three could not be contacted or scheduled. This last point of attrition is the most problematic for comparison purposes; however, the final control sample did not differ significantly from attendees in either specialty type or practice setting.

Chapter 5

Discussion

In the previous two chapters we have provided a lengthy account of how the research was carried out and what we found. In this chapter we synthesize our findings in two ways: evidence of change in physician practice behavior attributable at least in part to Heart House attendance, and evidence of the evaluation method's precision and efficiency as a means of identifying such changes.

Course impacts on behavior

Specific practice behavior changes were reported by a majority of attendees in both Heart House courses studied: 26 of 49 (53%) in 1983-84, and 39 of 53 (74%) in 1984-85. Nearly all attendees in both years also reported specific impacts on their knowledge or attitude, as well. These are impressive findings from an instructional standpoint, especially since substantial numbers of attendees in both years were *already* practicing in ways specified by the course objectives.

But as other writers have noted (e.g., Geertsma, *et al.*, 1982; Sanazaro, 1983; and Lockyer, *et al.*, 1985), identification of behavioral change attributable to CME is an exceptionally difficult task. It depends upon numerous features of the physician's practice, including numbers and types of patients seen, availability of facilities, and local practice policies and procedures. All of these factors shape the opportunity for change.

The interview data suggest that the depth and extent of observable change was directly proportional to the degree of program emphasis *and* to the opportunity for change to occur. In the echo course (1983-84), three program objectives were studied in detail. Physicians showed significant change pertinent to the objective dealing with suspected acute myocardial infarction. Coverage of this objective during the program was extensive (approximately three hours) and included material (viz., use of 2-D echo for assessing wall motion abnormalities) that was unfamiliar to many, if not most, attendees. There was no pre-post change relative to the objective on stroke (i.e., to reduce routine use of echo to locate source of embolus) although the *reasons* for ordering may have shifted somewhat. Coverage of this objective was specific but very brief, and in many cases, management of stroke patients was in the hands of other physicians. Finally, there was little evidence of physician change relative to the objective on ventricular arrhythmia. Coverage of this objective was virtually nonexistent, except for occasional oblique references embedded in discussions of other topics (such as congenital heart disease). In the rehabilitation course (1984-85), both course objectives—on risk stratification and patient education—received extensive program coverage, and even though substantial numbers of attendees were "at criterion" already, 60% changed risk stratification procedures, and 55% changed patient education methods. In both cases physicians had an opportunity to change their practices, in sometimes small but significant ways—for example, by increasing use of exercise stress tests (Objective 1), or by increasing emphasis on dietary lipids (Objective 2).

Accepting that attendee physicians did in fact make practice changes in

areas related to program content, what influence did the Heart House courses have in precipitating those changes? Studies that have attempted to isolate CME as an independent factor accounting for physician behavior change have found that CME consistently ranks behind other sources of information, such as journal articles and professional colleagues. Geertsma, *et al.* (1982), found that no more than 10% of reported behavior changes were seen to involve CME, and most of these occurred only after the physician had already become aware of the potential for change through other sources. Lockyer, *et al.* (1985) found that the relative impact of CME depended both on the physician's specialty area and the type of content presented: CME effects were strongest with family physicians and when they involved "investigations" (e.g., new radiological or laboratory services). Other important findings of the Lockyer, *et al.*, study were that most changes reflected refinement of clinical practice, not radical alterations in patient care; and that the "precipitating agent" for change only involved CME about 5% of the time.

Sanazaro (1983), after a comprehensive review of CME research, suggested four factors that improve physician performance or enhance CME effectiveness: "detailed specification of expected performance"; "professional environment conducive to a high level of performance"; "adequate resources"; and "direct intervention." He further suggested that the first factor, if perceived as timely and important, could have impressive results—but that the likelihood for permanent change is small without the second factor.

These studies suggest that the process of practice change is an ongoing phenomenon; that CME is most effective when it interacts with other sources of influence, often local colleagues; and that clinical practice infrequently changes immediately upon receipt of new information, but more often as the result of a cumulative effect.

Data from the present study support these observations in several ways. First, the two Heart House courses contained relatively little information that was new to the audience. Second, even though a majority of Heart House course attendees reported changes in practice behavior, these changes almost always reflected modifications or refinements of current practice: making echocardiograms more routine for patients with myocardial infarction, for example, or increasing emphasis on dietary lipids in patient education. Third, even though the time intervals between pre and post interviews were relatively short (about four months), numerous *other* influences on reported behavior change were reported in addition to the CME course, most often "research literature" and "discussions with colleagues." Fourth, the 1984–85 study showed that physicians who made significant practice changes were more likely to come from a group than solo practices. And fifth, behavioral change attributable to CME was subtle and often delayed. Immediate effects were often expressed as *intentions* to change rather than as change itself.

Results of the current study diverge from earlier research in one important aspect however. Our data suggest that, despite the array of qualifiers and contextual variables, traditional CME courses can have a significant impact on the behavior of practicing physicians, when: 1) behavior change is defined to include adjustments and refinements in patient care, as well as major practice changes; and 2) the opportunity exists for physicians to incorporate such modifications in their practices. When confronted with barriers such as hospital policies, lack of easily available equipment, or simply well-established alternative patterns of practice, change is slow and incremental.

Assessment of the Method

Our initial hypothesis was that a telephone interview conducted by a physician colleague would be more accurate, sensitive, interpretable, and feasible than other methods such as tests, questionnaires, or chart reviews. Our two years of experience with this method led us to the following conclusions.

A. *Accuracy*

1. *Reliability.* Test–retest consistency of the protocol was 66% and 70% for 1983-84 and 1984-85 respectively. In judging whether this statistic is adequately high, one must consider the characteristics of the protocol itself. Virtually all questions were open-ended, leaving the nature and detail of the response entirely up to the respondent. An analysis of the 30% "error" in 1984-85 revealed that approximately 40% of this error was traceable to differences in respondents' answers (in either substance or detail) across the two administrations. Employing a more closed-ended format could conceivably increase reliability but at the cost of decreasing flexibility of response and possibly neglecting important but unforeseen responses. A better way to increase reliability would be to reduce interviewer error (estimated at approximately 45% of total error), through more intensive training and feedback.

2. *Face validity* was strong in both years. Other studies that have collected physician practice data using interviews have reported good cooperation (e.g., Geertsma, *et al.*, 1982, and Lockyer, *et al.*, 1985), and our experience was the same. Among physicians who chose to comment on the evaluation method itself, positive comments outweighed criticisms by almost two to one. Confidence in the method increased among project interviewers, from some mixed feelings in the first year to strong support in the second year owing largely to the simplified protocol format and increased precision of the questions. All interviewers in both years felt that the method captured important information unavailable by other means.

3. *Content validity.* In this study, course faculty were asked which course objectives they felt were most important, and these areas were then probed in detail in the protocol. Thus, the depth of understanding was chosen over breadth of information—and in that sense, content validity was sacrificed, even though respondents were given the opportunity to talk about other learning. The more important question for this study, then, was the extent to which the protocol reflected content most in the course. The first-year protocol was developed for a course that had not been given at Heart House before, and was based upon assumptions about attendee characteristics that proved to be wrong. Accordingly, course content and emphasis was changed in significant ways by the course director during the course itself, and only one of the three protocol objectives was covered extensively in the program. Careful attention was given to this problem in 1984–85 by selecting a course for study that had been offered several times before and by involving the course director and her faculty more directly in protocol development. As a result, both protocol objectives received extensive program coverage.

4. *Construct validity* remains the most difficult to document, and will be discussed here in some detail. The study design allowed for an examination of construct validity from several different perspectives.

One problem with using pre-program interviews is that they may affect learning outcomes by making attendees conscious of desired outcomes ahead

of time, and thus may artificially influence post-program responses. This possibility was tested in the echo course by randomly partitioning the attendee group into two subgroups: one had both pre and post interviews, while the other had post interviews only. An analysis of post-program responses across the two groups revealed essentially similar responses, and thus there was no evidence that this influence had occurred. As a result of these findings, all attendees received pre–post interviews in 1984-85.

A larger concern was for "response error" (Sudman and Bradburn, 1982): inaccuracies in responses due to memory, motivation (i.e., presenting oneself in a favorable light), or lack of understanding of the question asked. The latter problem does not appear to have been a serious factor in this study. Each protocol was pilot tested, debriefed, and revised several times before it was used. Further, in both years the interview data reflected change where one might most expect it, namely in areas receiving greatest program emphasis (e.g., use of echo for MI patients in 1983–84, use of exercise tests for risk stratification in Year 2). Areas receiving little or no program coverage (e.g., use of echo for arrhythmia in 1983–84, use of cardiac catheterization for risk stratification in 1984–85), showed little or no pre–post change. It is useful also to contrast the pre-program interview data collected in 1984–85 with program pretest results; this contrast revealed a tendency for attendees to report doing more risk stratification in the pretest than they reported during the interview. It is possible only to speculate at the reasons for this discrepancy, but the most plausible explanation would attribute the difference to factors created by the pretest context: proximity to the program in both time and space; responding to closed (vs. open-ended) questions; and knowledge of how other attendees were answering the questions (by revealing response distributions after each item). Hence, even though attendees completed the pretest anonymously, response bias may have been greater in this setting than during a personal telephone interview.

The chart review phase of the study was intended as an external check of response error, primarily memory and motivation, by measuring convergence between what was reported in the interviews and what was recorded in patient charts. Presumably, if an attendee physician reported using more echos or exercise tests with MI patients, such an increase would be observable in the charts. In 1983-84, convergence between interview and chart review data occurred among 78% of the 18 attendees returning chart surveys. In 1984-85, despite several attempts to increase the return rate of chart review surveys, only 10 were returned at all. Four of the ten had reported increased use of exercise tests in the interview, but none of these increases were confirmed in the charts.

In this study we learned some difficult lessons about the usefulness of chart reviews for large-scale, national programs. First, while physicians will readily submit to brief telephone interviews, obtaining chart data is much more difficult, and we were unable (given time and budget constraints) to identify incentive strategies that worked. The sample sizes eventually obtained were too small to allow for any meaningful interpretations. Second, the numbers of patients reported in the chart review were almost uniformly smaller than those reported in the interviews. Either the responding physician inflated the size of his or her practice in the interview, or sizable numbers of the physician's patients were overlooked in the chart review. The former would occur if respondents were vulnerable to "forward telescoping"

(Sudman and Bradburn, 1982): that is, if respondents included events from a previous time period in the period being asked about. The latter would occur if records in all relevant hospitals were not included, or if (as appeared to be the case in 1984-85) only those patients were included who were *officially discharged* by the physician, rather than others in his/her group. Other patients in his/her care may have been overlooked. Third, a two-month interval closely following the course is probably too short to see significant behavior changes reflected in charts: some respondents may have reported changes that were very recent at the time of the post-program interview; also, in at least some cases interviewees were likely responding on the basis of *intention* to change. Finally, even if the chart data were complete and their validity were established, their usefulness as a measure of program impact would be limited to *chartable behaviors*. Chart reviews are insensitive to changes in knowledge, attitude, and many other behaviors, such as changes in patient education practices as a result of the rehabilitation course. In short, the external criterion used to verify respondents' self reports is subject to serious inaccuracies of its own.

Other investigators have found serious problems with the accuracy of chart reviews. Zuckerman, *et al.*, (1975) found that between ⅓ and ½ of the information from patient encounters was not recorded in the office chart; the omission rate was especially high (greater than 90%) for patient education behaviors. Similar findings were reported in more recent studies by Norman, *et al.*, (1985), and Greenberg and Jewett (1984). Both studies also reported major problems with physician cooperation. A major study described by White, *et al.*, (1985) was considerably more successful, however: 71% of sampled physicians (including controls) agreed to have their charts reviewed pre and post CME, and the data revealed significant CME impact, even though office records were not standardized and often incomplete. Two aspects of the White, *et al.*, study design are relevant to the current discussion. First, the investigators reviewed patient charts for two six-month periods, pre and post program (vs. two-month periods in the current study), thus increasing the numbers of patients seen with the specified diagnosis. Second, all chart data were collected by a single chart abstractor who visited each physician's office personally to record the data. In the present study, given the geographical dispersion of attendees, we were forced to rely on questionnaires; hence, quality control over the data was not possible.

Based on all of the above, we conclude that an external "gold standard" for documenting the accuracy of self-reported physician behavior remains elusive. For such behaviors as prescription-writing, in which "performance" and "documentation" are one and the same, direct comparisons with self reports of change can be made. Curry and Purkis (1986) did this, and found strong statistical evidence of congruence between reported and actual behavior, sufficient to conclude that "the self report procedure is sufficiently valid to be recommended as a routine evaluation mechanism in CME courses" (p. 583). Hard evidence for the construct validity of assessments based on self report of other behaviors will be difficult to obtain. It is useful in this context to distinguish between two kinds of questions employed in an interview protocol: those that ask about behavior or facts, and those that ask about psychological states or attitudes. In principle, at least, questions of the first type are verifiable: they refer to external characteristics or events that are potentially observable by a third party. To say that they are verifiable "in principle," of

course, does not mean that verification is easy, legal, or ethical. Questions of the second type, however, are not even verifiable in principle, as psychological states exist only in the mind of the respondents (Sudman and Bradburn, 1982). Thus, if a primary purpose for the evaluation is to assess not only behavior change but also the *reasons for* behavior change, physicians themselves represent the only meaningful source of information.

B. *Sensitivity*

We had felt that the greatest strength of the interview method would be its sensitivity to complex as well as simple effects. The interview data revealed a broad range of CME impact, from reinforcement of current practice (about 50% of attendees in both years), to new knowledge (relatively small numbers), to actual or intended behavioral change. Further, the interview data helped identify practice-specific variables that affected CME impact: influence of hospital policies (generally, less than expected), access to facilities and equipment (crucial for the two programs studied), characteristics of the patient population and practice setting, and non-program influences on practice change. The interviews generated a great deal of idiosyncratic detail, due mostly to the open-ended nature of the protocol and the probing of the interviewers.

C. *Interpretability*

Pure detail, of course, is not enough—the data base must lend itself to organization, analysis, and interpretation in order for meaningful inferences to be drawn. Making the rich data base interpretable proved to be a more formidable task than we had expected. Coding the open-ended responses was difficult and time-consuming. Statistical summaries of codes across cases often seemed to destroy the context of individual answers; *patterns* of responses within individuals seemed more meaningful. Thus, case studies were used as an additional organizing tool. But despite the wealth of detail in the case studies, some important areas were not covered. For example, for the rehabilitation course, several questions were asked *about* risk stratification of the MI patient (which tests were used, how often, for what purpose, etc.) but sometimes the implicit question of *how* risk was determined was only implied, if that—and yet methods of *stratification* was the core theme of that particular program objective. The implication is that extreme care must be taken during the protocol development not to lose sight of core themes such as these, by constantly asking, "what will the answers to these questions reveal? Is that what we want to know?"

D. *Feasibility*

Two early concerns, relating to the feasibility of enlisting interested, competent interviewers and willing physician respondents, proved to be groundless. We were impressed by the levels of participation and commitment of both groups. All six interviewers found their experience worthwhile enough to participate as interviewers in the second year, in spite of the time demands. The level of participation among both attendees and controls was

high in both years: not only did they freely submit to the interviews, most seemed to have enjoyed the experience. Once physicians were on the phone, they were generally cooperative, and freely volunteered information about their practice behavior. But *getting* them on the phone in some cases required a great deal of diligence and effort. The amount of time required to reach some participants was the single most difficult impediment of this method.

E. *Conclusions: usefulness of the interview method*

Our conclusions about this method can be summarized in the responses to three questions.

1. *Can this technique effectively evaluate changes in medical practice?* Yes, for three reasons. First, telephone interviews, because of their open-ended, dialogue-oriented format, are more sensitive to course-specific changes than other survey forms. (Interviews also allow for a thorough explanation of *reasons* for change.) Second, with a carefully developed protocol, interviews are capable of collecting a great deal of information in a relatively short time, as little as 10-15 minutes. Third, while interview appointments can be difficult to arrange, course attendees are generally open and receptive to this approach.

An important caution must be noted, however. Interviews are not suitable for the collection of purely quantitative data (numbers of patients seen, numbers of stress tests done, etc.), as such information is likely to be affected by response errors, particularly memory errors. Carefully constructed questionnaires and/or chart reviews are likely to be more accurate. Interviews should be reserved for measures of change in attitude, clinical decision criteria, behavioral intent, and qualitative perceptions of course impacts.

2. *Under what circumstances should telephone assessment be used by the ACC or similar organizations providing CME?*

a. Use physicians with specialties similar to attendees as interviewers. Our study was based on the premise that only colleague physicians could gain the levels of credibility and rapport necessary for a successful interchange. While this premise was not tested directly in the study, comments made by both interviewers and respondents tended to support it.

b. Interviewing attendees pre *and* post program has both critical advantages and disadvantages. The most important advantage is the opportunity to obtain pre and post "snapshots" of a physician's practice. The study also demonstrated that a pre-program interview does not necessarily prejudice responses to a post-program interview. There are at least three important disadvantages of interviewing physicians twice, however. First, because of late registrations, pre-program interviews are difficult to complete prior to the course. Second, attendees are more easily recruited for one interview than two; some seemed disturbed by needing to respond essentially to the same questions twice. Third, use of a pre–post format makes the design of the protocol somewhat inflexible to changes in program content or emphasis. The protocol thus may not reflect the course as it was taught. Finally, there is some empirical evidence from other sources to suggest that post-only measures may, in fact, be better measures of change. In a comprehensive review, Howard (1980) found that respondents' post-intervention perceptions of change were more highly correlated with behavior change as rated by independent judges than were change scores derived from pre–post measures; further, he found the correlation of social desirability scores higher with pre–

post measures than with retrospective self-reports.

A pre-post format is perhaps best reserved for programs meeting three criteria: they have been offered several times before, and thus content and emphasis are unlikely to change significantly; specific outcomes are expected by physicians and faculty; and such change is critically important. For other programs, a post-only format is indicated. Additional investigation is needed to determine the extent to which these inferences are generalizable.

c. Because of high attendee participation rates, course evaluations should be possible with samples of attendees, rather than total attendee rosters. What is unclear is how large these samples need to be. Traditional statistical "power" calculations are generally inappropriate for the type of information collected in an interview protocol, for which "total score" has little meaning.

d. Training sessions for interviewers should focus on three skills: adherence to the protocol, probing techniques, and summarizing and recording detail. Experienced physician interviewers would be useful as consultants: the insights they derived as participants in the process should be valuable to prospective interviewers. We found role playing sessions very helpful as a vehicle for practicing and receiving feedback on these skills. Our sessions tended to focus more on practice than feedback; however, the analysis of our reliability data suggests that more attention to the latter is warranted, by demonstrating threats to reliability and pointing them out when they occur. Throughout the training session, two other points should be emphasized: the importance of capturing nuances of individual practices, and the overriding importance of rapport via colleague-to-colleague interaction. Finally, we suggest that interviewers be briefed on key features of course content and emphasis so as to become familiar with the context of the protocol and how the information sought relates to overall program goals.

3. *Is telephone assessment cost-effective?* Unquestionably, the procedures used to develop and test the method used in this project were expensive, about $150,000 in direct costs for the two programs studied. Should the method be employed more routinely, development costs would obviously be lower. In addition, costs could be significantly reduced for future studies—without significant loss of useful information—by studying random samples of attendees, by using a post-only design, and by exploring other ways of compensating physician interviewers (for example, by providing CME opportunities free of charge).

A related question is whether information of the sort obtained in an interview could be gathered more economically by other means. Telephone interviews are almost certainly less expensive than chart reviews. Even if one accepts the dubious assumption that chart reviews are appropriate for a broad range of CME courses, a substantial investment in quality control is necessary—considerably greater than we were able to provide. On the other hand, interviews are surely *more* expensive than written surveys. Data collection protocols similar to those used in the current study could be developed in questionnaire form, requiring the physician to write out or dictate responses to the questions posed. The loss of opportunity to probe or clarify responses would affect the accuracy and detail of the data; whether the difference would be justified by the lower cost is less clear.

In the end, the choice of an appropriate evaluation tool depends upon the purpose of the assessment, as well as the resources available. In the final chapter we suggest how the purposes of CME—and thus the *study* of CME—might be reexamined.

Chapter 6

Implications for Continuing Medical Education Practice

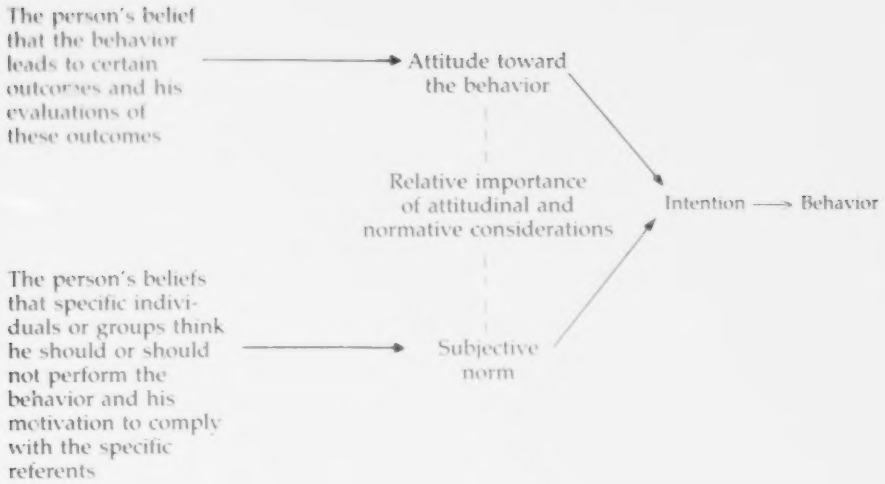
In this study we have demonstrated that behavioral change attributable to CME is complex and highly context-dependent. We have also shown how our findings corroborate and add to other CME research. What remains is to suggest what we believe to be a more realistic way of looking at CME as an alternative to the simplistic assumptions embodied in the conventional CME model, shown below:

Clinical knowledge ——→ CME course ——→ presumed behavior/practice change

Conventional approaches assume that traditional CME conferences are a major, if not *the* major, educational link between clinical research and practice; and that information conveyed through CME will affect medical practice in desired ways. Research on CME reported here and elsewhere, however, contradicts this view in two important ways. First, the relationship between knowledge gain and behavior change is consistently weak. Second, physician practice change is influenced by a host of factors, and formal CME is only one of them. Indeed, available evidence suggests that individuals who attend CME courses do so most often to confirm or reinforce what they are already doing, or intend to do—that in fact practice change has already taken place, or is in process. Thus, most changes due to a CME course are incremental.

An alternative approach

A reformulation of the role of CME may be in order. If in the past CME has been subjected to inflated expectations, how can these assumptions become more realistic? One way is to examine assumptions about how practice change occurs. Implicit in the conventional CME model is an assumption about planned change and the use of knowledge. The concept of planned change presumes a belief that an intervention can be designed to cause a desired effect on behavior. During the past twenty years, theorists have offered several explanations regarding the generation, dissemination, adoption and use of knowledge or innovation. Many of the explanations have been offered by social psychologists (Rogers, 1962; Schein and Bennis, 1965; Havelock, 1969; Glaser, 1973; Zaltman and Duncan, 1977). In general, their theories account for internal and external determinants of change, including motivating and inhibiting factors. These are all *macro* theories, however, and are of limited value for understanding and predicting individual behavior change. We have elected instead to review the implications of our study within a theory developed by Icek Ajzen and Martin Fishbein. Their "Theory of Reasoned Action" (Ajzen and Fishbein, 1980) conceptualizes linkages among beliefs, attitudes, intentions, and behavior as follows:


The person's belief that the behavior leads to certain outcomes and his evaluations of these outcomes
Attitude toward the behavior
Relative importance of attitudinal and normative considerations
Intention
Behavior
The person's beliefs that specific individuals or groups think he should or should not perform the behavior and his motivation to comply with the specific referents
Subjective norm

In brief, the theory postulates that most behavior is under an individual's conscious volitional control, and that the immediate determinant of that behavior is the person's *intent* to perform it. Of course, intentions do not always predict behavior; the strength of the relationship depends upon, primarily, the correspondence between measures of intention and behavior, and the stability of intentions. An example of the latter criterion from the research reported in this monograph would be that the predictive power of a physician's intent to use exercise stress tests for risk stratification of coronary patients would depend upon a list of extraneous and/or unknown events whose outcomes might change or influence the intention, such as cost or availability factors, reimbursement policy changes (such as DRGs), or competing information. Thus, intention must be measured as closely in time as possible to the opportunity for actual performance.

According to the theory, an individual's intention is an interactive function of two basic determinants. The first is *attitude toward the behavior:* the person's judgment that he or she favors or opposes performing the behavior. This attitude may have little to do with an individual's feelings about the object itself. For example, a physician may have positive feelings toward echocardiography in general, but negative feelings about using echo routinely for patients with myocardial infarction. The second determinant is *subjective norm:* an individual's perceptions of social pressures to perform or not perform the behavior in question. For example, a physician may perceive that authorities in the field, or colleagues whose opinion he values, think he *should* use echo routinely for MI patients. Therefore, according to the theory, it should be possible to predict and at least partially understand an individual's intention by measuring his attitude toward performing the behavior, his perceived subjective norm, and their relative weights.

The authors suggest that it is necessary to understand why such attitudes and subjective norms are held. According to the theory, attitudes are a function of beliefs. "Generally speaking, a person who believes that performing a

given behavior will lead to mostly positive outcomes will hold a favorable attitude toward performing the behavior, while a person who believes that performing the behavior will lead to mostly negative outcomes will hold an unfavorable attitude" (Ajzen and Fishbein, 1980, p. 7). These are called *behavioral beliefs*. Continuing the examples from our current research, if a physician believed that an echocardiogram significantly increased the chances of finding wall motion abnormalities in otherwise uncomplicated MI patients, that such procedures were cost effective, or that they posed minimal patient risk, he would be likely to evaluate positively the use of echo in such circumstances. *Normative beliefs* are those underlying a person's subjective norm. "Generally speaking, a person who believes that most referents with whom he is motivated to comply think he should perform the behavior will perceive social pressure to do so" (Ajzen and Fishbein, 1980, p. 7). If a physician believed that CME faculty, other physicians in his office practice, other respected authorities, or even his patients wished him to increase use of exercise stress tests for purposes of stratifying cardiovascular risk, he will perceive social pressure accordingly. Presumably, effects on behavioral and normative beliefs is where information provided in CME can have the greatest impact.

Research conducted in varying contexts, including weight loss, career choice, family planning, voting behavior, and many others, have confirmed the predictive power of this model, when beliefs, attitudes, and intentions are carefully measured as they pertain to performing the specific behavior in question. Our purpose is not to suggest that any existing conception of physician behavior be supplanted by the theory of reasoned action described above. Our purpose rather is to use this theory as an example of how broader, empirically based models of behavior may be useful in conceptualizing how selected populations (physicians) in selected contexts (CME) might be expected to change, and why. Our position is that only by carefully considering such alternative models as these will those responsible for designing and carrying out CME be able to free themselves from an activity that we consider to be self-defeating: namely, trying to document that an isolated event of CME either does or does not change physician practice behavior. CME can and does affect physician practices: but its impact can only be understood within the context of other important intervening variables.

Implications

What, then, are the specific implications for CME, especially national programs like those at Heart House, which are suggested by our research?

1. *Needs assessment.* Any organization such as the ACC should routinely reexamine its fundamental purposes for sponsoring CME. Are courses offered to: a) teach clinical knowledge and skills on the basis of identified practice needs, b) provide a review and synthesis of information, or c) present *new* information at the forefront of medical knowledge and practice? Purposes *b* and *c* may be accomplished through a variety of forums in addition to CME courses: forums such as journals and self-study programs. Purpose *a* is most directly suited to traditional CME conferences, and the opportunities they afford for collegial interaction. Yet, little is typically known about the "practice needs" of course attendees: settings, practice patterns, practice constraints, and reasons for course attendance. Instead, needs are typically identified by

program faculty based upon assumptions of attendee profiles in these areas. We have found that such assumptions may be incorrect. In both Heart House programs studied, for example, a larger percentage of physicians came to the courses *already practicing* what was being taught than had been anticipated. Faculty were teaching to purpose *a* when, in fact, attendees had come for purpose *b*.

If the desire is to structure courses so as to better accomplish purpose *a* (that is, to attract more physicians not already at criterion performance), then more attention could profitably be paid to program planning in general, and to needs assessment in particular, either through an annual comprehensive survey of physicians' practice patterns, or specific surveys related to individual CME courses.

Regardless of the needs assessment method(s) employed, we recommend that program planning carefully attend to the nature and degree of practice change expected as a function of the course, and the bases upon which such objectives were derived. Our experience has taught us that close interchange with the program director and his or her faculty is critical in this regard, to better match program goals with audience needs and expectations.

2. *Measurement of intention.* If, as the theory of reasoned action suggests, intent to perform is the single best predictor of behavior, then a direct assessment of intention to change would be an important and useful tool for assessing program outcomes. The research reported in this monograph has shown that actual behavior change is often delayed, and thus not accurately estimable until a period of months has elapsed. Moreover, our research has also shown that individual's reports of change within two months of CME courses are often better characterized as statements of intent. Therefore, short-term evaluations of behavior change may be well advised to focus directly and specifically on intention. Purkis' "commitment for change" survey (1982) is a clear example of this strategy. His survey, however, was done immediately following a CME course. Better predictive power could be obtained by delaying the survey until course participants had had a chance to assess, within the context of their own practices, the utility of knowledge acquired during the course. Then, a short telephone survey along the lines of the method we employed in our study could be used with a representative sample.

3. *Documentation of external variables.* One of the most intriguing questions to emerge from our research is, "For those physicians who attend Heart House courses with an opportunity to change their practices in course-related ways, what are the most important external factors which distinguish those who do change from those who do not?" The present study has offered hints as to what some of these factors might be, but the issue is important enough to warrant more detailed research, collecting data along such variables as these: age, medical school attended, type and size of practice, size of staff, journal subscriptions, professional memberships, nature of hospital affiliations, and governing hospital policies and procedures. All of these factors and probably others are likely to play a role in determining whether intentions to change are formed, and whether intentions are carried out. The most complex question, of course, is how these variables interact, and here a more descriptive, qualitative paradigm (such as the case study method) is appropriate, along the lines suggested by such scholars as Lincoln and Guba (1985), or Williams (1986).

4. *Measurement of beliefs and attitudes.* As we noted earlier, one of the most potentially productive areas of CME impact is in reinforcing or sometimes challenging already-held beliefs and attitudes about the practice behavior in question. The most common observation about the echo course, for example, was that the course confirmed attendees' sense of echocardiography as a useful and reliable clinical tool; the most frequent remark about the rehabilitation course was that it reinforced the need to increase use of exercise tests in practice. In the former example, the statement was expressed in terms of attitude toward echo itself, and thus may not be strongly predictive of practice change. In the latter example, however, the statement was expressed in terms of attitude *toward the behavior*, and thus may have considerably more predictive power. The implication therefore is that in the future, measures of belief, attitude or attitude change should be consciously designed to assess respondents' feelings about their own behavior change, rather than simple global statements about the value of a technique or procedure.

5. *Measurement of subjective norms.* This is one of the most neglected areas of CME research. What are attendees' perceptions of behavioral expectations held by course faculty, important colleagues, or patients? No attempt was made in our research to directly assess these variables, although we did discover serendipitously that physicians from group practices were more likely to change than those in solo practices. And a few respondents in both years did volunteer "patient wishes" as a factor partly responsible for their use of the procedures in questions. But these findings were suggestive only. Geertsma, *et al.* (1982), among others, have suggested that influence of colleagues is one of the most important factors behind physician behavior change, and recommended that more attention be paid in formal CME to group discussion during the program, and to followup networks back home. For assessment purposes, more precise data on subjective norms could be obtained through written surveys immediately after the course, assessing the influence of course faculty and other participants, and follow-up telephone surveys several months later to determine the long term influence of faculty, local colleagues, and patients.

One final observation. Throughout this discussion we have implied that physician behavior change, and the role that CME plays in it, is one deserving of considerably more research, especially if the research questions are reordered to include those areas we recommend. Without a doubt, such research can be expensive. But the investment made in CME by the American College of Cardiology and others is enormous. Recent estimates of the cost of continuing medical education range from 1.9 to 3 *billion* dollars (Lloyd and Abrahamson, 1979; Tupper, 1984). Looking carefully at practitioners' needs and expectations, designing courses with realistic objectives, and assessing those courses in ways that will sensitively measure practice impacts, will serve to increase the return on that investment.

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Appendices

Appendix A

Pre-program Interview Protocol: 1983–84

American College of Cardiology
Interview Protocol
Form A–Pre-program

INTERVIEWER: _____ DATE: _____
PERSON INTERVIEWED: _____ SUBJECT CODE: _____
PHONE # _____ CONTACTS (#) _____ START TIME: _____
Hello Dr. _____. This is Dr. _____ from _____ *(YOUR LOCATION)*. I am a member of and represent the American College of Cardiology. You may recall that the College recently initiated a study of continuing medical education and that you agreed to participate in the study.
The purpose of this telephone call is to complete an interview with you. The interview should take approximately 15 minutes. The data that are gathered will be treated confidentially. This interview is not being recorded; however, I will be taking notes. A summary of the completed interview notes will be sent to you for review. I wish to emphasize that this is a study of medical education, not an evaluation of your practice.

1. In general, the interview is a discussion of echocardiography and the role it plays in patient management. We are going to discuss some specific patient conditions, but first I'd like to ask about your overall views on the use of echocardiography. For which kinds of patients do you generally find echocardiograms most useful? (We're not after an all-inclusive theoretical list, but rather an idea of how you use echocardiography in your practice.)

(LIST SPECIFIC PATIENT CONDITIONS: PROBE WHERE NECESSARY.)

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

(MOVE TO NEXT PAGE)

PAGE 1

2. Now, Dr._____, I would like to ask specifically about your use of echocardiography for patients with suspected acute myocardial infarction. During the past two months, how many patients have you managed with this condition?

(IF GREATER THAN ZERO) *(WRITE NUMBER)* _____

(IF ZERO)

2a. If you *were* to manage patients with suspected acute myocardial infarction, would you order an echocardiogram during the first several days?

- - - - - - - - - - (*i.e., while in coronary care unit*)

(CIRCLE NUMBER)

YES 1
POSSIBLY 2
NO 3

(SKIP TO 4a, NEXT PAGE) →

2b. Of those patients you managed, for how many did you obtain an echocardiogram during the first several days?

(CIRCLE NUMBER)

ALL 1
SOME ..... 2 *(WRITE NUMBER)*_____
NONE 3

3. For those ___ patients you managed, were there any circumstances other than clinical indications that affected the number of echocardiograms you did or did not order?

(CIRCLE NUMBER)

EXAMPLES if asked . . .
Availability of echo equipment
Another technique ordered instead (Mugascan)
Hospital policies
Referral policies
Death of patient
Referring physician already ordered

NO 1
YES 2

3a. How many echocardiograms *would* you have ordered if those circumstances had not been present?

*(WRITE NUMBER)*_____

(SUMMARIZE FOR RESPONDENT, THEN MOVE TO NEXT PAGE) →

IF ONE OR MORE ECHOS WERE OR WOULD HAVE BEEN ORDERED BY RESPONDENT, MOVE TO QUESTION 4b. IF NO ECHOS WERE OR WOULD HAVE BEEN ORDERED BY RESPONDENT, MOVE TO QUESTION 4a.

→ 4a. What clinical indications *would* lead you to order and *not* to order an echocardiogram during the first several days? *(WRITE RESPONSES; PROBE AS NECESSARY)*

(TO ORDER:)

(NOT TO ORDER:)

(SKIP TO QUESTION 5, PAGE 5) →

→ 4b. What clinical indications led you to order echocardiograms for these ____ patients? *(WRITE RESPONSES; PROBE AS NECESSARY)*

("Some but not all") 4c. *(IF APPLICABLE)* What clinical indications, if any, led you *not* to order echocardiograms for the other ____ patients? *(WRITE RESPONSES; PROBE AS NECESSARY)*

(MOVE TO NEXT PAGE)

4d. What *other* indications, if any, would you consider in deciding whether or not to order an echocardiogram for a patient with suspected acute myocardial infarction during the first several days? *(WRITE RESPONSES; PROBE AS NECESSARY)*

(SUMMARIZE AND NOTE ADDITIONAL RESPONSES)

(MOVE TO QUESTION 5, NEXT PAGE)

5. Now I'd like to shift gears for a moment. You've listed several indications for ordering echos for MI patients. Do you recall where or how you learned those criteria?

(CIRCLE NUMBER)

YES 1
NO 2

(IF NO, MOVE TO NEXT PAGE) →

5a. What were the sources of those criteria?

(WRITE RESPONSES)

_____

_____

_____

_____

(MOVE TO NEXT PAGE)

6. Now, Dr. _____, I would like to ask specifically about your use of echocardiography for patients with stroke. In the past two months, how many patients have you managed or participated in managing this condition?

(IF GREATER THAN ZERO) *(WRITE NUMBER)* _____

(IF ZERO)

→6a. If you *were* to manage patients with stroke, would order an echocardiogram for them?

(CIRCLE NUMBER)

YES 1
POSSIBLY 2
NO 3

(SKIP TO 8a, NEXT PAGE) →

→6b. Of those ____ patients, for how many was echocardiogram ordered?

(CIRCLE NUMBER)

ALL 1
SOME ..... 2 *(WRITE NUMBER)*_____
NONE 3

7. If no other physicians were involved, and there were no circumstances beyond your control, for how many of those ____ patients would *you* have ordered an echo?

(CIRCLE NUMBER)

ALL 1
SOME ..... 2 *(WRITE NUMBER)*____
NONE 3

EXAMPLES if asked

Availability of echo equipment
Another technique ordered instead (Mugascan)
Hospital policies
Referral policies
Death of patient
Referring physician already ordered

(SUMMARIZE FOR RESPONDENT, THEN MOVE TO NEXT PAGE)

IF ONE OR MORE ECHOS WERE OR WOULD HAVE BEEN ORDERED BY RESPONDENT, MOVE TO QUESTION 8b. IF NO ECHOS WERE OR WOULD HAVE BEEN ORDERED BY RESPONDENT, MOVE TO QUESTION 8a.

8a. What clinical indications *would* lead you to order and *not* order an echocardiogram for stroke patients? *(WRITE RESPONSES; PROBE AS NECESSARY)*

(TO ORDER:)

(NOT TO ORDER:)

(SKIP TO QUESTION 9, PAGE 9) →

8b. What clinical indications would have led you to order echocardiograms for these ____ patients? *(WRITE RESPONSES; PROBE AS NECESSARY)*

("Some but not all") 8c. *(IF APPLICABLE)* For the other ____ patients for whom you would *not* have ordered an echo, what clinical indications would have led to that decision? *(WRITE RESPONSES; PROBE AS NECESSARY)*

(MOVE TO NEXT PAGE)

8d. What *other* indications, if any, would you consider in deciding whether or not to order an echocardiogram for a patient with stroke? *(WRITE RESPONSES; PROBE AS NECESSARY)*

(SUMMARIZE AND THEN NOTE ADDITIONAL RESPONSES)

(MOVE TO QUESTION 9, NEXT PAGE)

9. Dr. _____, you've listed several clinical indications for ordering echos for stroke patients. Do you recall where or how you learned those criteria?

(CIRCLE NUMBER)

YES 1
NO 2

(IF NO, MOVE TO NEXT PAGE) →

9a. What were the sources of those criteria?

(WRITE RESPONSES)

_____

_____

_____

_____

_____

(MOVE TO NEXT PAGE)

THANK YOU FOR YOUR PATIENCE, WE ARE NOW 2/3 OF THE WAY THROUGH. WE HAVE ONE MORE PATIENT CONDITION TO DISCUSS . . . . .

10. Dr. _____, I now want to ask about your use of echocardiography in your general cardiovascular evaluation of patients with ventricular arrythmia. In the past two months, how many patients have you managed with this condition?

(IF GREATER THAN ZERO) *(WRITE NUMBER _____)*

(IF ZERO)

10a. If you *were* to manage patients with ventricular arrythmia, would you order an echocardiogram for them?

(CIRCLE NUMBER)

YES 1
POSSIBLY 2
NO 3

(SKIP TO 12a, NEXT PAGE) →

10b. Of those ___ patients you managed, for how many did you order an echocardiogram?

(CIRCLE NUMBER)

ALL 1
SOME ..... 2 *(WRITE NUMBER _____)*
NONE 3

11. For those ___ patients you managed, were there any circumstances other than clinical indications that affected the number of echocardiograms you did or did not order?

(CIRCLE NUMBER)

EXAMPLES if asked . . .

Availability of echo equipment
Another technique ordered instead (Mugascan)
Hospital policies
Referral policies
Death of patient
Referring physician already ordered

NO 1
YES 2

11a. How many echocardiograms *would* you have ordered if those circumstances had not been present?

(WRITE NUMBER _____)

(SUMMARIZE FOR RESPONDENT, THEN MOVE TO NEXT PAGE)

IF ONE OR MORE ECHOS WERE OR WOULD HAVE BEEN ORDERED BY RESPONDENT, MOVE TO QUESTION 12b. IF NO ECHOS WERE OR WOULD HAVE BEEN ORDERED BY RESPONDENT, MOVE TO QUESTION 12a.

12a. What clinical indications *would* lead you to order and *not* to order an echocardiogram for patients with ventricular arrythmia? *(WRITE RESPONSES; PROBE AS NECESSARY)*

(TO ORDER:)

(NOT TO ORDER:)

(SKIP TO QUESTION 13, PAGE 13) →

12b. What clinical indications led you to order echocardiograms for these ___ patients? *(WRITE RESPONSES; PROBE AS NECESSARY)*

("Some but not all") 12c. *(IF APPLICABLE)* What clinical indications, if any led you *not* to order echocardiograms for the other ___ patients? *(WRITE RESPONSES; PROBE AS NECESSARY)*

(MOVE TO NEXT PAGE)

12d. What *other* indications, if any, would you consider in deciding whether or not to order an echocardiogram for a patient with ventricular arrythmia? *(WRITE RESPONSES; PROBE AS NECESSARY)*

(SUMMARIZE AND THEN NOTE ADDITIONAL RESPONSES)

(MOVE TO QUESTION 13, NEXT PAGE)

13. You've listed several clinical indications for ordering echos for patients with ventricular arrythmia. Do you recall where or how you learned those criteria?

(CIRCLE NUMBER)

YES 1
NO 2

(IF NO, MOVE TO NEXT PAGE) →

→ 13a. What were the sources of those criteria?

(WRITE RESPONSES)

_____

_____

_____

_____

_____

(MOVE TO NEXT PAGE)

14. Dr. _____, thank you for spending this time with me and for providing useful information. A summary of my interview notes will be send to you for review. Do you have any final questions or comments?

(NOTE RESPONSE) _____

_____

_____

_____

_____

_____

_____

_____

Thanks again for your time.

(END)

STOP TIME: _____

(CHECK NOTES FOR CLARITY AND LEGIBILITY)

PAGE 14

COMMENTS/CLARIFICATION:

(TO BE COMPLETED FOLLOWING INTERVIEW)

Barring circumstances beyond control, what clinical indications are used by this physician for ordering and not ordering echocardiograms for patients with:

I. Suspected acute MI (within the first several days)?

A. Ordering

B. Not Ordering

II. Stroke?

A. Ordering

B. Not Ordering

III. Ventricular arrythmia?

A. Ordering

B. Not Ordering

Appendix B
Post-program Interview Protocol: 1983–84

American College of Cardiology
Interview Protocol
Form B–Post-program

INTERVIEWER: _____ DATE: _____
PERSON INTERVIEWED: _____ SUBJECT CODE: _____
PHONE # _____ CONTACTS (#) _____ START TIME: _____

Hello Dr. _____. This is Dr. _____ from _____ *(YOUR LOCATION)*. I am a member of and represent the American College of Cardiology. You may recall that the College recently initiated a study of continuing medical education and that you agreed to participate in the study.

The purpose of this telephone call is to complete an interview with you. The interview should take approximately 15 minutes. The data that are gathered will be treated confidentially. This interview is not being recorded; however, I will be taking notes. A summary of the completed interview notes will be sent to you for review. I wish to emphasize that this is a study of medical education, not an evaluation of your practice.

1. In general, the interview is a discussion of echocardiography and the role it plays in patient management. We are going to discuss some specific patient conditions, but first I'd like to ask about your overall views on the use of echocardiography. For which kinds of patients do you generally find echocardiograms most useful? (We're not after an all-inclusive theoretical list, but rather an idea of how you use echocardiography in your practice.)

(LIST SPECIFIC PATIENT CONDITIONS: PROBE WHERE NECESSARY.)

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

(MOVE TO NEXT PAGE)

2. Now, Dr._____, I would like to ask specifically about your use of echocardiography for patients with suspected acute myocardial infarction. During the past two months, how many patients have you managed with this condition?

_____ *(IF GREATER THAN ZERO)* *(WRITE NUMBER)* _____

_____ *(IF ZERO)*

→ 2a. If you *were* to manage patients with suspected acute myocardial infarction, would you order an echocardiogram during the first several days?

- - - - - - - - - - *(i.e., while in coronary care unit)*

(CIRCLE NUMBER)

YES 1
POSSIBLY 2
NO 3

(SKIP TO 4a, NEXT PAGE) →

→ 2b. Of those patients you managed, for how many did you obtain an echocardiogram during the first several days?

(CIRCLE NUMBER)

ALL 1
SOME ..... 2 *(WRITE NUMBER _____)*
NONE 3

3. For those ___ patients you managed, were there any circumstances other than clinical indications that affected the number of echocardiograms you did or did not order?

(CIRCLE NUMBER)

EXAMPLES if asked

Availability of echo equipment
Another technique ordered instead (Mugascan)
Hospital policies
Referral policies
Death of patient
Referring physician already ordered

NO 1
YES 2

3a. How many echocardiograms *would* you have ordered if those circumstances had not been present?

(WRITE NUMBER _____)

(SUMMARIZE FOR RESPONDENT, THEN MOVE TO NEXT PAGE)

IF ONE OR MORE ECHOS WERE OR WOULD HAVE BEEN ORDERED BY RESPONDENT, MOVE TO QUESTION 4b. IF NO ECHOS WERE OR WOULD HAVE BEEN ORDERED BY RESPONDENT, MOVE TO QUESTION 4a.

4a. What clinical indications *would* lead you to order and *not* to order an echocardiogram during the first several days? *(WRITE RESPONSES; PROBE AS NECESSARY)*

(TO ORDER:)

(NOT TO ORDER:)

(SKIP TO QUESTION 5, PAGE 5)

4b. What clinical indications led you to order echocardiograms for these ____ patients? *(WRITE RESPONSES; PROBE AS NECESSARY)*

("Some but not all") 4c. *(IF APPLICABLE)* What clinical indications, if any, led you *not* to order echocardiograms for the other ____ patients? *(WRITE RESPONSES; PROBE AS NECESSARY)*

(MOVE TO NEXT PAGE)

4d. What *other* indications, if any, would you consider in deciding whether or not to order an echocardiogram for a patient with suspected acute myocardial infarction during the first several days? *(WRITE RESPONSES; PROBE AS NECESSARY)*

(SUMMARIZE AND NOTE ADDITIONAL RESPONSES)

(MOVE TO NEXT PAGE)

5. Now, Dr. _____, I would like to ask specifically about your use of echocardiography for patients with stroke. In the past two months, how many patients have you managed or participated in managing with this condition?

(IF GREATER THAN ZERO) *(WRITE NUMBER)* _____

(IF ZERO)

5a. If you *were* to manage patients with stroke, would you order an echocardiogram for them?

(CIRCLE NUMBER)

YES 1
POSSIBLY 2
NO 3

(SKIP TO 7a, NEXT PAGE) →

5b. Of those ____ patients, for how many was an echocardiogram ordered?

(CIRCLE NUMBER)

ALL 1
SOME ..... 2 *(WRITE NUMBER)*_____
NONE 3

6. If no other physicians were involved, and there were no other circumstances beyond your control, for how many of those ____ patients would *you* have ordered an echo?

(CIRCLE NUMBER)

EXAMPLES if asked . . .
Availability of echo equipment
Another technique ordered instead (Magascan)
Hospital policies
Referral policies
Death of patient
Referring physician already ordered

ALL 1
SOME ..... 2 *(WRITE NUMBER)*_____
NONE 3

(SUMMARIZE FOR RESPONDENT, THEN MOVE TO NEXT PAGE)

IF ONE OR MORE ECHOS WERE OR WOULD HAVE BEEN ORDERED BY RESPONDENT, MOVE TO QUESTION 7b. IF NO ECHOS WERE OR WOULD HAVE BEEN ORDERED BY RESPONDENT, MOVE TO QUESTION 7a.

7a. What clinical indications *would* lead you to order and *not* to order an echocardiogram for stroke patients? *(WRITE RESPONSES; PROBE AS NECESSARY)*

(TO ORDER:)

(NOT TO ORDER:)

(SKIP TO QUESTION 8, PAGE 8) →

7b. What clinical indications would have led you to order echocardiograms for these ____ patients? *(WRITE RESPONSES; PROBE AS NECESSARY)*

("Some but not all") 7c. *(IF APPLICABLE)* For the other ____ patients for whom you would *not* have ordered an echo, what clinical indications would have led to that decision? *(WRITE RESPONSES; PROBE AS NECESSARY)*

(MOVE TO NEXT PAGE)

7d. What *other* indications, if any, would you consider in deciding whether or not to order an echocardiogram for a patient with stroke? *(WRITE RESPONSES; PROBE AS NECESSARY)*

(SUMMARIZE AND THEN NOTE ADDITIONAL RESPONSES)

(MOVE TO NEXT PAGE)

THANK YOU FOR YOUR PATIENCE, WE ARE NOW ⅔ OF THE WAY THROUGH.

WE HAVE ONE MORE PATIENT CONDITION TO DISCUSS . . . . .

8. Dr. _____, I now want to ask about your use of echocardiography in your general cardiovascular evaluation of patients with ventricular arrythmia. In the past two months, how many patients have you managed with this condition?

_____ *(IF GREATER THAN ZERO)* *(WRITE NUMBER)* _____

_____ *(IF ZERO)*

→ 8a. If you *were* to manage patients with ventricular arrythmia, would you order an echocardiogram for them?

(CIRCLE NUMBER)

YES	1
POSSIBLY	2
NO	3

(SKIP TO 10a, NEXT PAGE) →

→ 8b. Of those ____ patients you managed, for how many did you order an echocardiogram?

(CIRCLE NUMBER)

ALL	1	
SOME	2	*(WRITE NUMBER)*_____
NONE	3	

9. For those ____ patients you managed, were there any circumstances other than clinical indications that affected the number of echocardiograms you did or did not order?

(CIRCLE NUMBER)

EXAMPLES if asked . . .

Availability of echo equipment
Another technique ordered instead (Mugascan)
Hospital policies
Referral policies
Death of patient
Referring physician already ordered

NO	1
YES	2

9a. How many echocardiograms *would* you have ordered if those circumstances had not been present?

*(WRITE NUMBER)*_____

(SUMMARIZE FOR RESPONDENT, THEN MOVE TO NEXT PAGE)

IF ONE OR MORE ECHOS WERE OR WOULD HAVE BEEN ORDERED BY RESPONDENT, MOVE TO QUESTION 10b. IF NO ECHOS WERE OR WOULD HAVE BEEN ORDERED BY RESPONDENT, MOVE TO QUESTION 10a.

10a. What clinical indications *would* lead you to order and *not* to order an echocardiogram for patients with ventricular arrythmia? *(WRITE RESPONSES; PROBE AS NECESSARY)*

(TO ORDER:)

(NOT TO ORDER:)

(SKIP TO QUESTION 11, PAGE 11) →

10b. What clinical indications led you to order echocardiograms for these ____ patients? *(WRITE RESPONSES; PROBE AS NECESSARY)*

("Some but not all") 10c. *(IF APPLICABLE)* What clinical indications, if any, led you *not* to order echocardiograms for the other ____ patients? *(WRITE RESPONSES; PROBE AS NECESSARY)*

(MOVE TO NEXT PAGE)

10d. What *other* indications, if any, would you consider in deciding whether or not to order an echocardiogram for a patient with ventricular arrythmia? *(WRITE RESPONSES; PROBE AS NECESSARY)*

(SUMMARIZE AND THEN NOTE ADDITIONAL RESPONSES)

(MOVE TO NEXT PAGE)

11. You've listed several indications for ordering echos for patients with myocardial infarction, stroke, and ventricular arrythmia. Do you recall where or how you learned those criteria?

(CIRCLE NUMBER)

YES 1
NO 2

(IF NO, MOVE TO NEXT PAGE) →

→ 11a. What were the sources of those criteria?

(WRITE RESPONSES)

11b. Of the sources you listed, which would you consider to be the *single most influential?*

(WRITE RESPONSE)

11c. How or why was it the single most important influence?

(WRITE RESPONSE)

(MOVE TO NEXT PAGE)

12. I have one more question about each of the 3 conditions we've discussed. Is the frequency with which you order echocardiograms different now from what it was in February, *or not*, for

12a. Patients with suspected acute myocardial infarction

(CIRCLE NUMBER)

NO 1
YES 2

How is it different?

(WRITE RESPONSE)

_____

_____

12b. Patients with stroke?

(CIRCLE NUMBER)

NO 1
YES 2

How is it different?

(WRITE RESPONSE)

_____

_____

12c. Patients with ventricular arrythmias?

(CIRCLE NUMBER)

NO 1
YES 2

How is it different?

(WRITE RESPONSE)

_____

_____

(MOVE TO QUESTION 13)

13. I want to focus now strictly on the Heart House program. Have you made, or will you make, any changes in your practice as a result of attending Dr. Feigenbaum's program in March?

(CIRCLE NUMBER)

NO 1
YES 2

13a. What are the changes you have made, or will make?

(WRITE RESPONSE)

14. Dr. _____, during this discussion we have focused on your *practice behavior*. In closing, let us please discuss other areas. How, if at all, did the Heart House program affect your thinking or feeling about echocardiography?

(WRITE RESPONSE)

(MOVE TO NEXT PAGE)

15. Finally, Dr. _____, we have one more request. Our hypothesis in this study is that a telephone conversation between two physicians is a better way of looking at practice than information written on a chart. We are, however, interested in looking at comparisons between the two sources of information for strictly research purposes. If you would allow someone of your staff to respond to a brief questionnaire on the number of patients you've seen with acute MI and the number of echos you've ordered for those patients, we would be able to test that hypothesis. The College would be most appreciative, and we will send you $100.00 as partial compensation for the effort. May I have your permission to send the survey to someone on your staff, with a check for $100.00?

(CIRCLE NUMBER)

NO 1
YES 2

15a. Thank you. What is the person's name to whom the form should be sent?

NAME _____

ADDRESS _____

16. Dr. _____, thank you for spending this time with me and for providing useful information. A summary of my interview notes will be sent to you for review. Do you have any final questions or comments?

(NOTE RESPONSE) _____

_____

_____

_____

Thanks again for your time.

(END)

STOP TIME: _____

(CHECK NOTES FOR CLARITY AND LEGIBILITY)

COMMENTS/CLARIFICATION:

(TO BE COMPLETED FOLLOWING INTERVIEW)

Barring circumstances beyond control, what clinical indications are used by this physician for ordering and not ordering echocardiograms for patients with:

I. *Suspected acute MI (within the first several days)?*

A. Ordering

B. Not Ordering

II. *Stroke?*

A. Ordering

B. Not Ordering

III. *Ventricular arrythmia?*

A. Ordering

B. Not Ordering

Appendix C
Case Studies: 1983–84

ATTENDEES—BEHAVIORAL CHANGE

Pre-Post Interviews

Dr. 1 practices in a small Southeastern community. He reports having made several changes in his use of echo during the period of the study; specifically he is increasing the use of echo for patients with suspected acute MI, and decreasing the use of echo in the case of stroke patients. He made no changes in his usage for patients with ventricular arrhythmias. His criteria for use of echo come from his training, experience, previous courses and his attendance at the recent Heart House course. During a two month period he sees about 30 cases of suspected acute MI, about 4 or 5 stroke patients, and 10 to 15 patients with ventricular arrhythmias. In the case of patients with suspected acute MI, he uses echo to assess the extent of the MI, and to provide a baseline evaluation of the patient especially for left ventricular function. He typically would not order echo for stroke patients because it provides a very low yield. For patients with ventricular arrhythmias he uses echo when there is no clearcut etiology and when he is looking for cardiomyopathy, aneurysms, etc.

Dr. 4 practices in a small Southwestern community. His criteria for the use of echo come from attendance at courses, especially the Heart House course. He reports making changes in his practice as a function of attending that course: specifically, he now uses echo on all of his patients with suspected acute MI. He will increase his usage of echo for patients with stroke and increase his usage of echo for patients with ventricular arrhythmias. Every two months he sees 15–20 patients with suspected acute MI and now all receive an echo. He sees 10–12 stroke patients during this period; almost all of these receive an echo as well. He sees about 12 patients with ventricular arrhythmias during a two month period, and perhaps three-fourths receive an echo. For patients with suspected acute MI, echo is now completely routine. He uses echo in the case of stroke patients because of the possibility of detecting an embolic stroke. He is interested in looking at wall motion abnormalities, myocardial dysfunction, or use of the echo in the case of patients with ventricular arrhythmia.

Dr. 9 practices in a small Southeastern community. The criteria he uses in deciding when to use echo in his practice come primarily from attendance at courses. He reports that he has made greater use of echo with patients with suspected acute MI as a function of the Heart House course but plans no changes in his use with stroke patients and patients with ventricular arrhythmias. During a two month period he sees 6–8 patients with suspected acute MI, and perhaps one-half of these get an echo. He sees 2–4 patients with stroke in a two month period, and perhaps half get an echo. He sees about 10 patients with ventricular arrhythmias during a two month period, and 30–40% of these might receive an echo. For patients with suspected acute MI he uses echo to explore wall motion abnormalities, look for suspected mural thrombi, and septal ruptures. In the case of stroke patients he uses echo

to look for underlying cardiac disease. In the case of patients with ventricular arrhythmia he uses echo to investigate cardiomyopathy, suspected wall motion abnormalities, and ventricular aneurysms.

Dr. 11 practices in a small Northeastern community. His criteria for use of echo come from the literature and discussions with colleagues. He reports some changes in his use of echo following the Heart House course, specifically a slight increase in the usage of echo in the case of stroke patients, a very strong increase in the case of patients with ventricular arrhythmia, and no change in his usage for patients with suspected acute MI. During a two month period he sees about 30 patients with suspected acute MI, and about half of these receive an echo. He sees 3–5 patients with stroke during a similar period; less than half receive an echo. He sees up to 20 patients with ventricular arrhythmias and all of these receive an echo. In the case of patients with suspected acute MI, he uses echo to help establish a diagnosis and to evaluate suspected pericardial effusion. For stroke patients, he uses echo to look at atrial fibrillation and mitral prolapse. For patients with ventricular arrhythmias he uses echo to look at heart murmurs, ECG abnormalities, and to help understand atypical chest pain.

Dr. 12 practices in a small Northeastern community. His criteria for the usage of echo derived primarily from his experience as a teaching faculty member in a Midwestern university in close proximity to the course director. As a function of attending this particular course he stated that he had increased his use of echo to some extent in the case of patients with suspected acute MI, but no change was anticipated in his usage for patients with stroke or ventricular arrhythmias. During a two month period he sees about 30 patients with suspected acute MI, and he increased his usage of echo for these patients from 50% to 80%. He sees 10–15 patients with stroke during that period, and perhaps 1 or 2 get an echo. He sees about 50 patients with ventricular arrhythmias during a two month period, and perhaps 20% of those patients get an echo. He uses echo for patients with suspected acute MI in order to rule out right ventricular infarct, to assess left ventricular function, to investigate new murmurs, and to investigate embolic phenomena. For patients with stroke, he uses echo to look at arrhythmias, valvular disease, and signs suggesting embolic phenomena. For patients with ventricular arrhythmia he uses echo to check out existing coronary or valvular disease and to explore cardiomyopathy.

Dr. 13 practices in a large Northeastern Canadian metropolitan area. His criteria for the use of echo come primarily from attendance at a training program at the Montreal Heart Institute. As a function of attending the Heart House course he increased his use of echo for patients with suspected acute MI, with no changes in his practice with respect to stroke or patients with ventricular arrhythmias. There has been some problem in the availability of echo to him. He sees 15–20 patients with suspected acute MI during a two month period, and increased echo use for these patients from 10% to 50%. He uses echo very infrequently for the small number of stroke patients that he sees, and he uses echo for 1/4 to 1/3 of the 5–10 patients with ventricular arrhythmias he sees during a two month period. In the case of patients with suspected acute MI he would use echo in order to delineate the area of the

infarction, assess left ventricular contractility, assess left ventricular aneurysms, and to assess acute pericardial effusion. For stroke patients, he would not use echo unless there was some clinical evidence of heart disease. If he suspected heart disease he would be using echo to check out sources of emboli, look at arrhythmias, assess possible valvular disease, suspected cardiomyopathy, and suspected left ventricular aneurysms. In the case of patients with ventricular arrhythmias he uses echo to check out mitral valve prolapse and suspected left ventricular aneurysms.

Dr. 14 practices in a large Southeastern community. The criteria for use of echo in his practice come primarily from his own training and close interaction with colleagues. He reports two changes in his practice following the Heart House course: he increased the use of echo with respect to patients who have suspected acute MI, and decreased the use of echo for stroke patients. He sees from 2–6 patients with suspected acute MI during a two month period and now two-thirds of these get an echo. He uses echo for these patients to evaluate possible aneurysms, to evaluate wall motion abnormalities, and to look for muscle rupture. He sees about 8 stroke patients during a two month period; formerly about three-fourths of these would have received an echo, now perhaps one-fourth might get an echo. He uses echo for these patients to assess atrial fibrillation, and to look for valvular heart disease, and suspected myocardiopathy. All of his ventricular arrhythmia patients get echo. He uses echo to look for possible mitral prolapse, valvular heart disease, ventricular aneurysm, and cardiomyopathy.

Dr. 17 practices in a small Southeastern community. His criteria for use of echo in his practice come from his reading of texts and journals and attending the Heart House course. 2-D echo equipment became available to him about the time of the course, and its availability cannot be separated from what he learned at the Heart House course in terms of their effects on his use of the equipment. He stated that as a function of the course, however, he is increasing his use of echo for patients with suspected acute MI and slightly increasing use of echo for patients with stroke. He has not changed his use of echo for patients with ventricular arrhythmia. He sees about 40 patients in a two month period with suspected acute MI, and now 50–60% get an echo. He sees about 5 patients every two months with stroke, and almost all have an echo. He sees large numbers of patients with ventricular arrhythmias, perhaps 40–50 during a two month period, and as many as half of those would get an echo. In the case of patients with suspected acute MI he uses echo to assess wall motion abnormalities, mural thrombus, pericardial fluid, assessment of either a new or an old murmur, and ruptured papillary muscle and possible septal defect. In the case of stroke patients he uses echo to look for sources of emboli, and assess murmurs, possible associated congestive heart failure, suspected mitral stenosis or mitral prolapse, and mural thrombus. For patients with ventricular arrhythmia he uses echo to look for suspected mitral prolapse, cardiomyopathy, and left ventricular function.

Dr. 19 practices in a small community in Alaska. He finds attending meetings to be the principal source of information from which he develops his criteria for the use of echo in his practice. As a function of attending the Heart House course he has made two changes in his practice: he uses echo more

frequently for patients with suspected acute MI, and less frequently for patients with stroke. He does not use echo at all for patients with ventricular arrhythmia. He is concerned about the expense of echo for his patients. During a two month period he sees perhaps 20–25 patients with suspected acute MI, about 15% get an echo. He sees a very small number of stroke patients, perhaps 2–3 during a two month period; very few have an echo done. He sees about 40 patients with ventricular arrhythmias during a similar period; none of these get an echo. For patients with suspected acute MI he uses echo when he suspects ventricular aneurysm, when the patient has recurrent chest pain, and when he wants to evaluate the extent of the MI. For stroke patients he uses echo when the patient had TIA's and no evidence of carotid disease. For patients with ventricular arrhythmias, if heart disease had already been established he would use echo to look for ventricular aneurysm and to evaluate myocardial function.

Dr. 20 practices in a small Southeastern community. The current literature is his primary source of information for the criteria he uses for echo in his practice. As a function of attending the Heart House course he reported using echo much more frequently and routinely for patients with suspected acute MI, but no change in usage for patients with stroke or ventricular arrhythmias. During a two month period he sees about 25 patients with suspected acute MI, and increased use of echo for these patients from 20–80%. He sees 4–5 stroke patients in a similar period; most of these would receive echo but he has real concerns about its value. He sees about 25 patients in a similar period with ventricular arrhythmias, and perhaps 10% of these would get echo. In the case of patients with suspected acute MI he uses echo to evaluate myocardial function and wall motion abnormalities, follow up the use of Streptokinase, look at new murmurs and look for intracardiac clots. For patients with stroke he uses echo for suspected congestive heart failure and looks for sources of emboli. For patients with ventricular arrhythmias he uses echo in cases of suspected mitral prolapse, and to look for wall motion abnormalities.

Dr. 21 practices in a small Northeastern community. A cardiology fellowship which he completed in 1981 is the principal source of information for his criteria regarding the use of echo. He reported making several changes in his practice following the Heart House course. He is using echo more frequently for patients with suspected acute MI; it is virtually routine for all patients in this category now. He has also increased his usage of echo for patients with ventricular arrhythmias. During a two month period he sees about 30 patients with suspected acute MI. He sees 10–15 stroke patients during a similar period, and 50–60% of these would receive echo, although this physician believes that echo contributes very little to the management of these patients. In two months he sees 25–30 patients with ventricular arrhythmias, and uses echo in about 80%. For patients with suspected acute MI he uses echo to evaluate left ventricular function, wall motion abnormalities and new murmurs. For patients with stroke he uses echos if patients are young and if there is a suspected embolic etiology such as atrial fibrillation or acute MI. For patients with ventricular arrhythmia, he uses echo to evaluate left ventricular function, and to rule out aneurysms, mitral valve prolapse and IHSS.

Dr. 22 practices in a small Northeastern community. His principal sources of information for echo come from courses, textbooks, and especially courses offered by Heart House. He reported that he is now more aggressive in his use of echo for patients with suspected acute MI than he was before attending the Heart House course; but the course has not affected his practice in the use of echo for patients with either stroke or ventricular arrhythmia. He sees about 30 patients with suspected acute MI during a two month period, and one-third of them have an echo. He sees about 15 patients with stroke during a two month period, and most get an echo. He sees only 2–3 patients during a two month period with ventricular arrhythmias. For patients with suspected acute MI he uses echo to assess wall abnormalities, to evaluate cardiogenic shock, to rule out ventricular aneurysms, and to check for possible pericardial effusion. For patients with stroke he is especially concerned about using echo if the patients are young and if the stroke is localized. He would be interested in using echo in the presence of atrial fibrillation, suspected SBE, or valvular heart disease.

Dr. 23 practices in a small Northeastern community. His criteria for use of echo come primarily from textbooks that he has been studying preparing for his cardiology boards. Since the Heart House course he has increased use of echo for patients with suspected acute MI. He reported no change with respect to stroke patients or with respect to patients with ventricular arrhythmia. During a two month period he sees about 40 patients with suspected acute MI, and almost all have an echo. During a similar period he sees about 25 patients with stroke and about 75% of these would get an echo. Most of the stroke patients for whom an echo was ordered were patients of neurologists, and he was ordering the echo to satisfy their needs. He sees 30–35 patients during a two month period with ventricular arrhythmias, and all of them get echos. For patients with suspected acute MI he uses echo to check or assess wall motion, aneurysms, pericardial effusion, cardiomegaly, and mural thrombus. For stroke patients he uses echo to check for the source of the embolus, left atrial size, possible mural thrombus, possibility of aneurysms, and suspected vegetation. For patients with ventricular arrhythmias he uses echos for wall motion assessment, suspected aneurysms, general ventricular function assessment, and to check the possibility of an earlier myocardial infarct.

Dr. 24 practices in a small suburban community adjacent to a large metropolitan area in the Northeast. His criteria for use of echo comes from the literature, his experience, and attending echo courses. After attending the Heart House course he has made greater use of echo because he is now aware of more indications for patients with suspected acute MI. He plans no change in his usage with respect to patients with stroke or ventricular arrhythmias. During a two month period he sees about 30 patients with suspected acute MI, and slightly more than half receive echos. These are patients with an equivocal diagnosis; in such cases he assesses wall motion, size of the left ventricle and left atrium, and perhaps murmurs. During a two month period he sees about 10 stroke patients, 20% receive an echo to look for the source of the emboli or thrombus. Twelve out of the 15 ventricular arrhythmia patients he sees during this period receive echos; he assesses wall motion, cardiomyopathies and wall thickness.

Dr. 27 practices in a small Northeast community. His criteria for use of echo come from reading and attending courses. As a function of attending the Heart House course he makes more use of echo for patients with suspected acute MI. He does not plan any changes in his usage with respect to stroke or ventricular arrhythmia patients. In a two month period he sees about 16 patients with suspected acute MI; about half get an echo. He looks at left ventricular function, left ventricular wall motion, and generally for complications of the infarct. He sees about ten stroke patients in this period and, given complete control of these patients, only about 10% would get an echo. He rarely thinks this is useful but it is often ordered by the neurologist. He sees about 75 patients with ventricular arrhythmias during this period, and about half of these get an echo, in the case of suspected left ventricular aneurysms, cardiomyopathy, assessment of left ventricular function, and assessment of valvular disease.

Dr. 29 practices in a small Midwestern community. His criteria for the use of echocardiography come from attending courses, especially the Heart House course. He has increased his use of echo for patients with suspected acute MI, because echo will better enable him to assess wall motion abnormalities. During a two month period he sees about 6 patients with suspected acute MI; about two-thirds get an echo. Dr. 29 uses echo to assess wall motion, to look for possible left ventricular thrombus, and possible left ventricular aneurysm. During a two month period he sees about 5 patients with stroke, and about half of these get an echo. The primary purpose is to look for the source of the embolus. He also uses echo for transient ischemic attack. Elderly patients would not get an echo. During a two month period he sees about 10 patients with ventricular arrhythmia; about 40% get an echo, to look for suspected mitral prolapse and to assess wall motion abnormalities.

Dr. 30 practices on the edge of a large metropolitan area. His criteria for use of echocardiography come from reading and attending courses, especially those given by the present course director. He believes that because of the course he uses echo less frequently than in the past. During a two month period he sees about 30 cases of suspected acute MI; none of these get an echo. Presumably he would order echo only in the case of complications due

to congestive heart failure, arrhythmias, or new murmurs. He sees about 4 stroke patients during the period; all 4 patients would get an echo typically, except when the stroke etiology was self-evident. He sees 2 or 3 patients with ventricular arrhythmias every two months, and all of them get an echo, to assess for evidence of aneurysm and wall motion abnormalities.

Dr. 32 practices in a small Northeastern community. He does his own echos. His criteria for their use come from his study of the literature and attending courses. As a function of attending the Heart House course he made more use of echo for patients with suspected acute MI, believing the echo will give him a better understanding of wall motion problems. He has also used echo more heavily for patients with left ventricular arrhythmias, to gain a better understanding of their etiology. During a two month period he sees about 10 patients with suspected acute MI, and about two-thirds get an echo to determine wall motion abnormalities and generally evaluate myocardial infarction. He rarely sees stroke patients and would not use echo frequently for them. During a two month period he sees about 10 patients with ventricular arrhythmias and almost all of these get an echo. He thinks it is especially important in the case of young individuals.

Dr. 33 practices in a medium sized Western community. He finds journals and meetings to be a principal source of criteria in deciding when to use echocardiography in his practice. He has made greater use of echo after attending the Heart House course in the area of suspected MI's. During a two month period he sees about 12 patients with suspected acute MI, about half of these would get an echo. Dr. 33 would be looking for possible pericardial infusion, left ventricular function, or a new murmur. He sees 3–4 stroke patients during a two month period and each case would get an echo, although he would not use echo in the case of a classical thrombotic stroke. He sees about 12 patients with ventricular arrhythmias during a two month period, about half would get echo, for evidence of a mitral prolapse or cardiomyopathy.

Dr. 34 practices in a large metropolitan area in the East. His criteria for the use of echocardiography come from attending echo courses and from reading the literature. As a function of attending the Heart House course he reduced his use of echo for stroke patients, and probably increased it for patients with ventricular arrhythmia. During a two month period he sees about 30 patients with suspected acute MI; about one in six get an echo. He would like to have more get an echo but 2-D is not readily available to him at this time. He uses echo for these patients to evaluate left ventricular function and to look for thrombi. In the last two months he has seen 20 stroke patients; he has not used echo for any of them, apparently because these patients had typical, clearcut cerebral infarct. In a two month period he sees about 40 patients with ventricular arrhythmias, 75% or more would get an echo to assess left ventricular function and look for left ventricular aneurysms.

Dr. 40 practices in a large Midwestern city. His criteria for the use of echocardiography come from attending echo courses and reading the literature. As a function of attending the Heart House course he has made greater use of echo for patients with suspected acute MI. He also notes that he is now more aware of the value of echo where there are unusual conditions. Over a

two month period he sees 7–8 patients with suspected acute MI; about 10% get an echo to look for hidden heart failure, the possibility of pericarditis, associated valvular disease, possible muscle dysfunction, and etiology of otherwise unexplained symptoms. He sees about 5 patients with stroke during this same period; 20–30% get an echo to look for suspected mural thrombus, associated possible myocardial infarct, or possible arrhythmia. He sees very few patients with ventricular arrhythmia.

Dr. 42 practices in a large Northeastern metropolitan area and gets most of his criteria for use of echocardiography from his own training. As a function of attending the Heart House course he is more confident in the use of echo, and uses it more frequently for suspected acute MI and somewhat more frequently for patients with ventricular arrhythmia. During a two month period this physician has seen only a very small number of patients. For patients with suspected acute MI, echos would be ordered where there is reason to suspect congestive heart failure, or a new murmur, but echo would not be used for uncomplicated, routine MI's. For stroke patients echo would be used for all cases except routine, classical strokes. He orders for patients with ventricular arrhythmia only if there is some complication like recurrent ventricular tachycardia, aneurysm, or a history of MI.

Dr. 46 practices in a small community in the Midwestern section of the country. He finds the literature to be his best source of information from which to establish his own criteria for the use of echo. He does use echo more frequently in the case of patients with suspected acute MI as a function of having attended the Heart House course, but does not anticipate any changes in his pattern of usage for stroke and ventricular arrhythmia patients. During a two month period he sees 12–15 patients with suspected acute MI; about 40% get echos. He uses echo when there is a question about the severity of the MI or a question about the diagnosis. He sees about 5–6 stroke patients in a two month period and gets echo on about half of these, mostly when there is evidence of underlying heart disease or reason to suspect heart disease. He sees about 20 ventricular arrhythmia patients in a two month period with about half of these getting an echo primarily to look for evidence of underlying heart disease.

Dr. 47 practices in a large mid-Atlantic metropolitan community. His criteria for the use of echocardiography come primarily from his past training with some augmentation from his reading of the literature. As a function of attending the Heart House course he makes more use of echo for patients with suspected acute MI. He does not anticipate any changes in his usage of echo with respect to stroke patients or patients with ventricular arrhythmia. During a two month period he sees about 20 patients with suspected acute MI, about 20% receive echo, especially for assessment of left ventricular function. This is one of the major outcomes for him of the course. He is also interested in looking for pericardial effusion, mural thrombus, and associated valvular disease. In a two month period he sees 5 stroke patients; about 60% receive echo to help him look for the cardiac cause of stroke. He would not use echo in the case of a classical stroke with no clinical suspicion of associated heart disease. In a two month period he sees about 10 patients with ventricular arrhythmia, and about three-fourths get an echo, as a baseline assessment of left ventricular function and to look for suspected mitral valve prolapse.

Dr. 48 practices in a large Midwestern metropolitan area. His criteria for the use of echocardiography come primarily from his reading of the literature. In response to his attendance at the Heart House course, he has increased his use of echo for patients with suspected acute MI. He anticipates no changes in his use of echo for stroke patients or patients with ventricular arrhythmias. In the last two months he saw 18 patients with suspected acute MI. He did not order any echos, but his criteria for ordering include evaluating new wall motion abnormalities, evaluating new murmurs (that is, septal rupture or mitral capillary muscle dysfunction), and evaluating possible pericardial effusion. He saw 2 stroke patients during the last two months, both received echos. He was looking for intracardiac source of emboli. In a two month period he sees about 100 patients with ventricular arrhythmias, about 25% of these get echo. He is looking for valvular disorders and wall motion abnormalities and cardiomyopathies.

Dr. 49 practices in a suburb of a large Midwestern metropolitan area. He finds that attendance at courses contributes most to his own criteria for the use of echocardiography. As a function of the Heart House course he has increased his use of echo slightly for suspected myocardial infarction. No changes are anticipated in his use of echo for stroke and ventricular arrhythmia patients. During a two month period he sees about 10 patients with suspected acute MI; all of these have gotten echo to evaluate wall motion, mural thrombi, and pericardial effusion. In the same time period he sees about 5 stroke patients, about half will get echo to look for evidence of underlying heart disease. He sees about 10 patients with ventricular arrhythmia in a two month period. 80% of these get echo to look for suspected wall motion abnormalities.

ATTENDEES—NO BEHAVIORAL CHANGE

Pre-Post Interviews

Dr. 2 practices in a small mid-Atlantic community. His criteria for the use of echo come from his experience, reading the literature, and participating in echo conferences in a large metropolitan coronary care center. He runs the echo lab at his community hospital. He states that he "loves" echo. He plans to make no changes in his personal use of echo as a function of the Heart House course, although the course confirmed his opinion regarding its value, and he is making changes in the hospital protocol for use of echo by other physicians. He sees about 10 patients in a two month period with suspected acute MI for whom echo is routine; he sees perhaps 15–20 stroke patients, all of whom receive an echo, unless the stroke were uncomplicated, or if they were elderly. He sees perhaps 30–40 patients with ventricular arrhythmias, and all of these receive an echo. He is especially interested in looking at wall motion problems for these patients.

Dr. 3 practices in a large Southcentral metropolitan area. His criteria for the use of echo come from his own experience and keeping up with the current literature which he thinks is quite reliable. He reports that he plans to make no changes in his use of the echo as a function of having attended the Heart House course. During a two month period he sees about 25 MI patients.

About half receive an echo. He sees about 10 stroke patients during this period; 4–5 get an echo. He sees 15–20 patients with ventricular arrhythmias during a two month period, and all of these get an echo. He uses echo in the case of patients with suspected acute MI to assist in diagnosis, especially in the case of chest pain syndromes, and in helping to look for complications in an MI. He uses echo in stroke patients where there is any evidence of any underlying cardiac disease. Echo is useful to him in patients with ventricular arrhythmia to assess left ventricular function, chamber size, wall motion, to assist in looking for coronary disease, and cardiomyopathy.

Dr. 5 practices in a small Midwestern community. His criteria for the use of echo come from his training, especially from a fellowship with the course director. He attended the course primarily to renew his acquaintance with the course director and anticipates making no changes in his practice as a function of having attended the course. During a two month period he sees about 50 patients with suspected acute MI; about three-fourths of these get an echo routinely. He sees about 10 stroke patients during the period; none of these receive an echo. He sees a small number of patients with ventricular arrhythmia, and most of these get an echo. In the case of patients with suspected acute MI he uses echo to look for pericarditis, ventricular aneurysm, and seeks to quantify the size of the infarct. He believes echo just is not helpful and provides no useful information for the management of stroke patients. Echo is useful, he believes, in the case of patients with ventricular arrhythmias when a ventricular aneurysm is suspected.

Dr. 6 practices in a small Northeastern community. His criteria for the use of echo come primarily from a fellowship some time ago; however, he does not have a portable echo readily available to him and plans to make no changes in his use of echocardiography as a function of attending the course. In a two month period he sees about 15 patients with suspected acute MI; less than 20% might receive an echo. He sees 2–4 patients with stroke, about half receive echo. He sees about 10 patients with ventricular arrhythmias, and about 25% receive an echo. He uses echo in patients with suspected acute MI to look for ventricular aneurysms and to investigate new murmurs. For patients not receiving echos he relies primarily on information available from nuclear studies. Stroke patients almost routinely get an echo as a way to look for unsuspected cardiac disease. He uses echo for patients with ventricular arrhythmia if they are young, or if he suspects a ventricular aneurysm.

Dr. 7 practices in a small Appalachian community. His criteria for use of echo come from his attendance at courses and especially Heart House courses. 2-D echo is not readily available to him; if it were he would use it almost routinely for patients with suspected acute MI as a function of his learnings at the course. Although his utilization of echo for stroke patients is already low, he believes the course confirms that pattern and he might decrease it even more. Depending upon the availability of the echo, he would use it almost routinely for patients with ventricular arrhythmias. He sees about 20 patients a month with acute MI, and 3–5 patients every two months with stroke; very few of these patients get an echo. He sees up to 10 patients during a two month period with ventricular arrhythmias, and almost all of them get an echo. In the case of patients with suspected acute MI, he uses echo to evalu-

ate wall motion abnormalities, to evaluate mitral valve abnormalities, and to evaluate the ejection fraction. He would use echo in the case of stroke patients only if there were some suspicion of associated heart disease. He finds echo useful in his patients with ventricular arrhythmias when cardiomyopathy is suspected and when he is interested in looking at wall motion abnormalities.

Dr. 8 practices in a small Southeastern community. His criteria for the use of echo come primarily from his attendance at conferences. He reports that the course has influenced his usage of echo but the small number of patients he sees makes it difficult to detect the pattern in his practice. He did state that he is more confident in his usage of echo and will take more courses in its use. He believes that the echo contributes little to the management of stroke patients. He plans to use echo more frequently with patients with ventricular arrhythmias. In managing patients with suspected acute MI he uses echo to assess ventricular function, especially after Streptokinase and he uses it to look for mural thrombi. He would use echo in the case of stroke patients only if there is some reason to suspect an associated cardiac disease. For patients with ventricular arrhythmia he uses echo to look for ventricular wall motion abnormalities and to assess ventricular contractility.

Dr. 10 practices in a small Northeastern community. The literature is the source of his criteria for the use of echo. He reports making no changes in his practice as a function of having attended the Heart House course. During a two month period he sees 6–15 patients with suspected acute MI, and none of these receive echo. He sees 3–5 patients with stroke, and 2–5 patients with ventricular arrhythmias, about half of the patients in both groups receive echo. He believes that echo is generally not helpful in the case of patients with suspected acute MI, but if he used it he would be looking for ventricular aneurysms, and investigating a new murmur. He has a similar view with respect to stroke patients, and would not use it for routine stroke in elderly patients except if he suspected underlying heart disease or to look for possible cardiomyopathy, valvular heart disease, or endocarditis. For patients with ventricular arrhythmias he would find echo useful to determine the etiology of heart disease and use it to differentiate between ischemic heart disease and cardiomyopathy.

Dr. 15 practices in a small Midwestern community. His training as a cardiology fellow is the principal source of his criteria for the use of echo in his practice. He reports that he has made less use of echo for stroke patients following the course, with no changes in his practice of echo usage for patients with suspected acute MI or patients with ventricular arrhythmias. He sees about 10 patients every two months with suspected acute MI, and about half get echos. While he intends to use echo less frequently for stroke patients, nearly all continue to have the procedure. He sees 6–7 patients with ventricular arrhythmias during a two month period; all receive echos. With respect to patients with suspected acute MI, he uses echo to help establish the prognosis, to look for right ventricular infarct, pericardial effusion, and to look at new murmurs. He uses echo for stroke patients when there is some evidence for heart disease, in which case echo might be helpful in looking for valvular disease, atrial arrhythmias, or mitral valve prolapse. He uses echo

for all patients with ventricular arrhythmias to evaluate left ventricular function, chamber size, possible aneurysms, and mitral valve prolapse.

Dr. 16 practices in a small Northeastern community. His own clinical experience provides the basis for his criteria in making use of echo. He reported making no changes in his practice following the Heart House course, although it did stimulate him to subscribe to an echo journal. During a two month period he sees 15–20 patients with suspected acute MI, and about 25% receive an echo. He sees from 20–30 patients with stroke during a similar period, and about a third have an echo. He sees from 20–30 patients with ventricular arrhythmias and almost all of these would get an echo. In patients with suspected acute MI he uses echo to evaluate a murmur, to obtain information on previous damage, to evaluate chamber size, to evaluate possible right ventricular infarction, and pulmonary congestion. He uses echo for stroke patients if he suspects underlying heart disease, to aide in the search for emboli in the case of endocarditis. He uses echo routinely for all of his patients with ventricular arrhythmia, using it to look for mitral valve prolapse, ASH and LBH.

Dr. 18 practices in a small Mid-Atlantic community. The criteria for his use of echo come from his attendance in courses. 2-D echo is not readily available to him, but he indicated that he hopes to add that capability in the near future. He plans to make no changes in his usage of echo, however, as a function of attending the course. During a two month period he sees 10–15 patients with suspected acute MI, and few of these would get an echo. He sees stroke patients infrequently, but if he had complete responsibility for these patients, none of them would get an echo. He sees perhaps 50 patients with ventricular arrhythmias; 10% might get an echo. When he uses echo for patients with suspected acute MI he evaluates new murmurs, heart chamber size, possible pericardial effusion, and possible right ventricular infarct. He generally feels, however, that echo is not helpful. In the case of stroke patients he uses echo to look for clots and possible endocarditis. For patients with ventricular arrhythmias he uses echo to look for suspected wall motion abnormalities.

Post Only Interviews

Dr. 25 practices in a large metropolitan area. His criteria for use of echocardiography come primarily from reading journal articles. During the study period he changed his pattern of usage, toward routine ordering of echo for all ventricular arrhythmia patients. During a two month period he sees about 12 patients with suspected acute MI; almost all have echos. He finds echo for these patients most useful in assisting clinical decisions. During the same two month period he sees about 24 stroke patients, and less than 10% receive an echo. He orders echo for stroke patients when there is a history of arrhythmia, a history of myocarditis or suspected valvular disease. He sees about 6 patients with ventricular arrhythmia every two months, and all get the echo.

Dr. 26 practices in a small Midwestern community. His criteria for making use of echocardiography in his practice come from reading the literature. He made no specific changes in his use of echocardiography during the study

period. During a two month period he sees about 20 patients with suspected acute MI, and about half of these would get echos. He looks for wall motion, suspected aneurysm, thrombus, or extent of the infarct. Generally, he uses echo in the case of a very sick patient or a patient with an uncertain diagnosis. During a two month period he sees very few patients with stroke, and none of these would get an echo. He doesn't generally use echo for stroke patients because it does not change the clinical management. He sees about 50 patients with ventricular arrhythmia during a two month period, and about half of these would get an echo. This is very routine in patients under 40 and other patients where there is suspected cardiomyopathy or where he wants to assess wall motion.

Dr. 28 practices in a large metropolitan area. His criteria for the use of echocardiography come from his own experience, from reading the literature, and attending courses. He does not plan any changes in his practice as a function of having attended the Heart House course. He sees about 40 patients with suspected acute MI in a two month period. Almost all of these get an echo. About the only patients who would not get an echo are those who have complications, that make it technically unfeasible to carry out an echo procedure. He sees about 10–15 stroke patients during this period and about 60% of these receive an echo. He would not order an echo for stroke patients suffering a classical hypertensive stroke or classical hemorrhagic stroke. He sees about 50 patients with ventricular arrhythmia during the period; all of these patients get an echo, to assess left ventricular function, and to look for the possibility of myocardial disease and possible endocarditis.

Dr. 31 practices in a large metropolitan area. He has only M-mode echo available to him, would like to have 2-D now that he has been to the Heart House course. His own clinical experience, however, is his primary guide in establishing criteria for the use of echo. If 2-D were available to him he would probably make more use of it; since it is not he does not anticipate changing his pattern of echo usage. During a two month period he expects to see 6 patients with suspected acute MI; perhaps half of these would warrant use of echo, but he does not use echo in the average uncomplicated case. He sees about 6 stroke patients during a two month period, and about a third get an echo if he suspects underlying rheumatic disease or if there is evidence of congestive heart failure or cardiomyopathy. He sees about 30 ventricular arrhythmia patients during the period, and perhaps 10% of these get an echo to look for valvular disease or left ventricular dysfunction or cardiomegaly.

Dr. 35 practices in a small Southern community which has a 200 bed hospital. His criteria for the use of echocardiography come from attendance at courses and reading textbooks. 2-D echo equipment only became available to him during the study period and he now uses that equipment quite confidently as a function of having attended the Heart House course. During a two month period he sees about 5 patients with suspected acute MI; about 80% get an echo to look at wall motion abnormalities, correlate data with the MUGA, and exclude right ventricular problems. During this two month period he sees about 8 patients with stroke; about half an echo. He uses echo to exclude embolic sources of stroke. He sees about 50 patients with ventricular arrhythmia every two months, and less than 10% have an echo—very young patients suspected of mitral prolapse or cardiomyopathy.

Dr. 36 practices in a medium sized Southern community. Courses and literature provide the principal source of his criteria for the use of echocardiography. As a function of attending the Heart House course he anticipates making more use of echo with stroke patients but does not plan to change his practice with respect to suspected acute MI patients or patients with ventricular arrhythmia. During a two month period he sees 40–50 patients with suspected acute MI; none of these patients get echo because almost all of them have cardiac cath, and he thinks echo would not add any additional information. He sees perhaps five stroke patients during this period; about 40% get echo, those with associated murmurs or prior myocardial infarction. He sees about 200 cases of ventricular arrhythmias every two months; all of these patients get an echo for assessment of left ventricular function, mitral valve prolapse, and cardiac murmur.

Dr. 37 is a cardiology fellow in a large metropolitan area. His criteria for usage of echo come from training he is currently receiving as well as his reading and course attendance. He does not plan any changes in his use of echocardiography as a function of the Heart House course. During a two month period he sees about 100 patients with suspected acute MI. Currently about 10 of those get echo; he would like to give the echo to about 50 but the echo is not readily available to him. He would not order the echo for routine, uncomplicated MI patients. He sees about 10 stroke patients during the two month period, and all of them would get an echo to assess suspected cardiac disease. He sees about 40 patients with ventricular arrhythmia during a two month period; about 25% of these get an echo. He believes that would be helpful in assessing suspected organic heart disease or cardiomyopathy.

Dr. 38 practices in a large metropolitan community in the midAtlantic region. This physician currently has only M-mode echo available but as a function of attending the course is now interested in purchasing a 2-D echo for office use and is making more use of echo in his hospital. The numbers of patients seen for the three conditions across a two month period are small, but this physician does report intending to use echo more frequently for patients with suspected acute MI and for patients with ventricular arrhythmia.

Dr. 39 practices in a small mountain community in Appalachia. Although he attended the Heart House course he became ill the first day and thus was able to attend only about 1/4 of the total course. Based on that limited attendance, he does not anticipate making any changes in his practice as a function of having attended the course. During a two month period he sees about 60 patients with suspected acute MI; less than 10% get an echo, although many of the others would get a MUGA. For those getting an echo he looks for mural thrombus or suspected mitral valve prolapse. During a two month period he sees about 5 patients with stroke; he avoids use of echo if there is no suspicion of an embolus clinically or if it is a classical stroke. He sees about 100 patients with ventricular arrhythmia in a two month period; less than 10% have an echo, those with suspected mitral valve prolapse or suspected associated acute MI. He does not believe echo is helpful in management of ventricular arrhythmias.

Dr. 41 practices in a small mid-Atlantic community. His criteria for the use of echocardiography come from attendance at courses and reading the literature.

He does not anticipate any changes in his usage of echocardiography as a function of attending the Heart House course. During a two month period he sees about 10 cases of suspected acute MI; about 80% get echo and he would typically order echo for all except the very uncomplicated MI's. He sees about 15 stroke cases, about 20% of these would get an echo to look for possible embolic source for the stroke. He would also use echo for very young patients with possible mitrial prolapse. He sees about 25 ventricular arrhythmia patients; about half would get echo to evaluate left ventricular function, mitral prolapse, and cardiomyopathy.

Dr. 43 practices in a small mid-Atlantic community. He gets his criteria for the use of echocardiography primarily from his teachers and from his own clinical experience. He does not have 2-D echo available to him, only M-mode; MUGA-scan is available. As a function of attending the Heart House course, he is considering purchasing 2-D equipment. For a two month period he sees about 10 patients with suspected acute MI, and about half would get echo. He uses echo to assess associated pericarditis, assess left ventricular function, and uses echo data as a baseline for future studies. He sees about 12 stroke patients during this two month period; none of these receive echo and he would not order echo unless there were some reason to suspect associated valve disease, atrial fibrillation, congenital heart disease, or associated MI. He sees about 16 patients with ventricular arrhythmia during this period; about half of these receive M-mode echo, presumably to evaluate suspected endocarditis, cardiomyopathy, or wall motion change.

Dr. 44 practices in a medium sized Northeastern community. His prior training is his principal source of criteria for the use of echocardiography in his practice. He does not anticipate making any changes in his practice as a function of the Heart House course. During a two month period he sees about 60 patients with suspected acute MI; less than 10% get echo now, but if equipment were more readily available, approximately half would get echo. He uses echo for suspected pericardial effusion, assessment of left ventricular function, large anterial wall motion, and embolic phenomena. He has not seen any stroke patients in the last two months but would use echo for stroke patients for suspected mitral valve prolapse, recent MI, valvular heart disease, cardiomyopathy, or suspected right to left shunt. He sees about 10 patients every two months with ventricular arrhythmia; about 80% have echo to assess suspected cardiomyopathy, and to evaluate wall motion abnormalities and valvular heart disease.

Dr. 45 practices in a medium sized mid-Atlantic community. His criteria for use of echocardiography in his practice come from his reading and from attendance at the Heart House course. Although he does not anticipate any changes in his practice immediately as a function of this course, he has greater appreciation for the value of echocardiography as a tool that can stand alone. During a two month period he sees about 20 patients with suspected acute MI, and all of these get an echo. He finds the additional information useful in establishing a diagnosis and as a baseline level for future assessment. In a two month period he sees 3 stroke patients, all receive echo, to check out the possibility of mural thrombus, a suspected silent MI, aortic stenosis, or cardiomyopathy. During a two month period he sees 15 patients with ventricular arrhythmia; all receive echo. He uses it to assess cardio-

myopathy, connective tissue disease, ischemic heart disease, and wall motion abnormalities.

Dr. 50 practices in the Midwest. Until three weeks prior to this interview his practice had been in the emergency room. He has just recently moved into cardiology. He has not really seen enough patients to establish a pattern of usage of echocardiography, although he states that as a function of having been to the Heart House course he would probably use echo more frequently for all three kinds of patients. He has read the course director's text and that has been his principal source of information in this area. For patients with suspected acute MI he would order an echo for most patients to rule the diagnosis in or out, to look for thrombus and to help uncover any complications. For stroke patients he would use echo to look for evidence of underlying heart disease, would not use echo if there were no suspicion at all of underlying heart disease or if there were clear evidence of carotid disease. For patients with ventricular arrhythmias he would use echos for all patients to look for wall motion abnormalities, to determine heart size, and assess for possible mitral valve prolapse and cardiomyopathy.

CONTROLS—BEHAVIORAL CHANGE

Dr. C-12 practices in a small community in the Northeast. His criteria for the use of echocardiography comes from reading the literature and attending courses. He attended an echo course different from the course under study during the study period, and presumably that accounts for his indication that, although he had not made any changes in his use of echo for MI patients, he has tended to increase his use of echo for stroke and patients with ventricular arrhythmia. During a two month period he expects to see about 55 or 60 cases of suspected acute MI and perhaps 10% of these would get an echo to look for pericardial effusion, thrombus, or ventricular aneurysms. He sees 25–30 strokes in a two month period and slightly less than 1/4 of these would get echos to assess for atrial fibrillation, associated valvular disease, and evidence of recent MI. During the same two month period he sees perhaps 50–60 cases of ventricular arrhythmia and 1/5 to 1/4 of these patients would get an echo to look for suspected left ventricular aneurysms and to evaluate wall motion.

CONTROLS—NO BEHAVIORAL CHANGE

Dr. C-1 is a third year resident in medicine. He reports no changes in his use of echocardiography during the period of the study. His principal source of information for the use of cardiography comes from the attending staff in cardiology at his hospital. His second source is the literature and within that source he believes he has been most influenced by the present course director's writings. He sees 10 to 20 patients with suspected acute myocardial infarction every 2 months. He uses the echocardiogram routinely for these patients to assist in making the diagnosis, studying the infarction, and evaluation post Streptokinase. The only stroke patients he sees are those who are referred because of suspected embolism and they use echocardiography in all of these patients. For patients with ventricular arrhythmia the echocardiograph is used routinely because of concern for valvular abnormalities,

congestive failure, cardiomyopathies, and evaluation of post myocardial infarction.

Dr. C-2 is in practice in a small city where echocardiography is not routinely available in his hospital and primary practice. He reports no changes with respect to the use of his echocardiography during the period of the study. With respect to patients with suspected acute MI he generally does not order echos because he feels they are not cost effective relative to other diagnostic tools. He *would* order an echo for evaluation of left ventricular function. He orders echos for stroke patients when there is reason for suspecting an embolus. About half of the patients with ventricular arrhythmias he sees during a two month period (15 to 20) receive an echo. He is especially interested in exploring left ventricular dysfunction in valve prolapse. With respect to the other conditions, he sees 10–20 patients with suspected acute myocardial infarction during a two month period and during the same two month period perhaps five patients with stroke. His principal source of information guiding his use of echo is the literature.

Dr. C-3 is in a practice in a medium sized community. He reports no changes in his use of echo during the period of the study. He cites three sources of information for guiding his use of echo: his own experience, his discussions with the echocardiographer in his hospital, and his readings of the literature. During a two month period he sees about 20 patients with suspected acute MI and perhaps 1/4 of those would get an echo, primarily to evaluate left ventricular wall motion. He would not order an echo for patients with an uncomplicated infarct or a terminal patient or patients who had a MUGA-scan. During a two month period he sees perhaps three stroke patients and one of those might get an echo to look for the etiology of possible embolus or the possibility of endocarditis. He would not order an echo in the case of cerebral hemorrhage. In the two or three patients he might see during a two month period having ventricular arrhythmias, one or two might get an echo to assess for abnormalities in wall motion.

Dr. C-4 is in practice in a large metropolitan area. He reports no changes in his use of echocardiography during the period of the study. His information about the use of cardiography comes from his training as a fellow in cardiology and current continuing education courses. During a two month period he sees about 30 patients with suspected acute MI and 1/4 to 1/2 of these patients get an echo, primarily to assess ventricular function. He would not order echo in the case of uncomplicated MI's. He sees about a dozen stroke patients during a two month period and 1/2 to 2/3 of these would get an echo, to look for a possible source of embolism primarily and to assess the possibility of mitral valve prolapse. He sees about 25 patients with ventricular arrhythmias during a two month period, and 2/3 of these receive an echo, to look for possible cardiomyopathy and ventricular aneurysms.

Dr. C-5 is in practice in a medium sized community and he does his own echos but needs technician help from time to time and sometimes that is unavailable to him. He reports no changes in his use of echo during the period of the study. His principal source of information guiding the use of echo comes from his own experience and literature and occasional courses. During

a two month period he sees 16–20 patients with suspected acute MI. None of these patients get an echo but perhaps a number of them would if he had technicians available. He very rarely sees a stroke patient and is unlikely to use echo with them. For patients with ventricular arrhythmias he will see 5–10 during a two month period and all of these would get echos. In using echos for his ventricular arrhythmia patients he would be looking for possible aneurysms.

Dr. C-6 practices in a very large metropolitan area. He reports that he has not made any changes in his practice in use of echocardiography during the period of the study. He utilizes his own experience, the literature, and continuing education courses as his primary information source guiding his use of echocardiography and relies primarily on his own experience. During a two month period he sees perhaps 20 patients with suspected acute MI and only 1 or 2 of these would get an echo. He would rather use a MUGA-scan. During a two month period he would see about 15 patients with stroke and about half of these would get echo. This would be done primarily if there was any suspicion of intra cardiac thrombus. He sees about 50 patients with ventricular arrhythmias during a two month period and up to 1/3 of these might get echocardiography to check for the possibility of mitral valve prolapse, or cardiomyopathy.

Dr. C-7 practices in a small community in the Northeast. He reports no changes in his use of echocardiography during the period of the study. His own clinical experience and the literature guide his use of echo. He believes that the quality of echo work which is available to him is not high enough for him to make consistently good use of it. For the 20 or so cases of suspected acute myocardial infarction he sees every two months, 2 or 3 of them might get echo for suspected pericardial effusion. Perhaps 1/3 of the 18 or so stroke patients he sees during this period would also receive echo, especially if the patients were young. One-third to 1/2 of the 12 or so ventricular arrhythmias seen during a two month period would have echos if he suspected valvular disease or ventricular aneurysms.

Dr. C-8 practices in a small community in the Northeastern part of the country. He reports that he has made no changes in his use of echocardiography during the period of the study. The criteria he uses in deciding on the use of echo come from his own personal judgment and from attending conferences. He sees about 7 patients with suspected acute MI during a two month period; none of these get an echo. Dr. C-8 has made no changes in his use of echocardiography during the period of the study. He would expect to see 3 or 4 stroke patients during a two month period. He would expect to see a fairly large number of patients with ventricular arrhythmias (45–50) and all of these would probably get an echo, since he orders echos routinely for ventricular arrhythmia patients, to look for wall motion and valvular lesions and general information on cardiac status of the patient. He specifically believes that echo is not helpful with respect to MI's; he does use MUGA-scan in those cases.

Dr. C-9 practices in a small community in the Northeast. He reports making no changes in his use of echocardiography during the period of the study. His criteria for deciding when to use echo come from the literature, from his

own training, and occasional conference attendance. During a two month period he would see about 25 cases of suspected acute MI, and perhaps 1/4 of these would receive an echo. Evaluation of left ventricular function would be the most important use. He sees very few stroke patients and it is unlikely that he would order the echo for them; if he did it would be to check out arrhythmias, murmurs, or suspected clots. He sees about 25 patients with ventricular arrhythmias during a two month period; about 2/3 of these would get echo in order to get a better picture of the arrhythmia, and to detect wall motion abnormalities.

Dr. C-10 practices in a medium sized Midwestern city. He reports making no changes in his use of echocardiography during the period of the study. His criteria for deciding when to use echo come primarily from echo courses he has attended, from his colleagues and from reading journals. During a two month period he sees 25 to 30 cases of suspected acute MI; 1/3 of these would get an echo. He uses echo to evaluate left ventricular dysfunction and perhaps look for sources of emboli. He would see in a similar period 2–4 cases of stroke, and perhaps half of these would get echo to help find sources of emboli. He sees about 5 cases of ventricular arrhythmia during this period and perhaps 50% get echo to assess mitral valve prolapse, evaluation of left ventricular dysfunction and possible myocardiopathy.

Dr. C-11 practices in a small medium sized community. He reports that he has not made any changes in his use of echocardiography during the study period. His principal source of criteria for use of echo comes from attending an earlier course given by the present course director. He sees about 40 suspected MI patients during a two month period; 80–90% of these would get an echo to help him localize the site of the infarction. He sees about 25 stroke patients during a two month period and perhaps about 1/4 of these get an echo to help find the source of embolus. He sees about 130–140 patients with ventricular arrhythmias during this two month period; almost all of these would get an echo and certainly all who were refractory to conventional medications.

Dr. C-13 practices in a small suburban community adjacent to a large metropolitan area in the Northeast. His criteria for deciding when to use echo come from attending courses and especially one previously taught by the present course director. He reports that he has made no changes in his use of echocardiography during the study period. During a two month period he sees from 20–30 patients with suspected acute MI and about 25% of these get an echo. He orders echo in the case of suspected complications. He doesn't believe it is useful in a normotensive patient. Further, he has some problems with the quality of the technician in providing these echocardiograms. During a two month period he sees from 5–10 stroke patients, and one or two of these would get an echo, in the case of atrial fibrillation, suspected intramural thrombus or valvular heart disease. He sees 40–50 patients with ventricular arrhythmias during a two month period and about 1/4 of these would have an echo done. He would use echo only when he had no other clinical evidence for the cause of the arrhythmia and probably would not use it in older patients.

Dr. C-14 practices in a small community in the Northeastern part of the United States. He has a 2-D echo in his office and his criteria for use of the echo comes from his experience in using it and from attending a number of echo-related conferences and courses. He reports having made no changes in his pattern of usage of echocardiography during the study period. During a two month period he expects to see 15 cases of suspected acute MI and about 2/3 of these would get an echo. He orders echo almost routinely for all patients with suspected acute MI. He would not have an echo if it put the patient at an additional expense or a prior echo was available. During the same two month period he sees 4 or 5 stroke patients and about 2/3 of these would get an echo. He would not order an echo in the case of stroke patients where it seemed to be a classical stroke in hypertensive elderly patients or where there was already an explanation for the stroke. During a two month period he sees about 15 patients with ventricular arrhythmia. Almost all of these patients would get an echo. He would find this especially useful in evaluating left ventricular function.

Appendix D
Chart Survey: 1983–84

Return to: ACC Project Director
MCV Station Box 124
Richmond, VA 23298

AMERICAN COLLEGE OF CARDIOLOGY

Chart Summary for Dr. _____

Please complete each of the following questions. To provide the appropriate information, it will be necessary to review patient charts of the physician noted above.

1. List the patients with acute myocardial infarction or suspected acute myocardial infarction managed by this physician from January 1, 1984 through February 29, 1984. (Include all patients with suspected acute MI on admission as well as other patients already admitted who developed signs of acute MI.) Use a convenient three-digit code, such as the first two letters of the first name and first letter of the last name, to record the list. Then *underline* each patient who received an echocardiogram during the first week of hospitalization. (Example: "Frank Sullivan" was a MI patient managed during this period, and received an echocardiogram during the first week. The code would appear as *FRS*. "James Bell" was managed during this period but did not receive an echocardiogram during the first week. That code would appear as JAB).

2. List the patients with acute myocardial infarction or suspected acute myocardial infarction managed by this physician from _____ to _____. Use the same criteria as for Question 1. Underline each patient who received an echocardiogram during the first week of hospitalization.

Please complete this questionnaire by July 20, 1984 and return it in the enclosed stamped envelope. If you have questions about it, please contact Dr. Jon Wergin at (804) 257-1121.

Appendix E

Pre-program Interview Protocol: 1984–85

American College of Cardiology
Interview Protocol
Form A–Pre-program

PERSON INTERVIEWED: _____ SUBJECT CODE: _____
(numeric code)

PHONE #: _____ START TIME: _____

CITY AND STATE: _____

INTERVIEWER: DATE: _____

NUMBER OF CONTACTS REQUIRED BY SECRETARY TO SET UP APPOINTMENT: _____

NUMBER OF CANCELLED INTERVIEW APPOINTMENTS: _____

Hello Dr. _____. This is Dr. _____ from _____ (YOUR LOCATION). I am a fellow of and represent the American College of Cardiology. You may recall that the College recently initiated a study of continuing medical education and that you agreed to participate in the study. This interview should take approximately 15 minutes. Your responses will be treated confidentially. A summary of the completed interview notes will be sent to you for review. I wish to emphasize that this is a study of medical education, not an evaluation of your practice.

This interview in general deals with the rehabilitation of coronary patients who have survived an acute myocardial infarction.

1. First I'd like to ask about your practice. How would you describe your practice as it relates to cardiac patients? (Examples: full-time cardiology, internal medicine with emphasis in cardiology, director of cath lab, cardiac rehabilitation specialist).

[1] _____
_____
_____

2. What is the setting of your practice?

[2] ___ Solo practice ___ University based
___ Group practice ___ Other: _____
_____

[3] Comment: _____
_____

(MOVE TO NEXT PAGE)

3. Now, Dr. _____ I'd like a reading on the number of patients you see with myocardial infarction. About how many patients with acute MI do you discharge in a typical month?

[4] _____ (IF NONE SEEN, MOVE TO QUESTION 5, PAGE 5.)
(number)

4. Before discharge, or within a week or two thereafter, how do you identify those patients at high risk for recurrent infarct or sudden death?

(FOR EACH TEST, ASK THESE QUESTIONS:
1) About how many of those ____ patients have this test?
2) How do you decide which patients will have the test?
3) What information do you look for from the test?)

[5] A. Exercise test Information volunteered? ___ Yes ___ No
[6] Number of patients: _____ (NOTES)
[7] 2) How decide: _____
_____
_____
[8] 3) Look for: _____
_____
_____

[9] B. Exercise radionuclide Information volunteered? ___ Yes ___ No
[10] 1) Number of patients: _____
[11] 2) How decide: _____
_____
_____
[12] 3) Look for: _____
_____
_____

[13] C. Cardiac cath/angio Information volunteered? ___ Yes ___ No
[14] 1) Number of patients: _____
[15] 2) How decide: _____
_____
_____
[16] 3) Look for: _____
_____
_____

(MOVE TO NEXT PAGE)

(ASK SPECIFICALLY ABOUT THESE TESTS ONLY IF VOLUNTEERED)

(NOTES)

D. Resting radionuclide

[17] 1) Number of patients: ____

[18] 2) How decide: _____

_____

_____

[19] 3) Look for: _____

_____

_____

E. Ambulatory ECG

[20] 1) Number of patients: ____

[21] 2) How decide: _____

_____

_____

[22] 3) Look for: _____

_____

_____

[23] F. Echo (SPECIFY TYPE: M-Mode, 2-D)

[24] 1) Number of patients: ____

[25] 2) How to decide: _____

_____

_____

[26] 3) Look for: _____

_____

_____

(MOVE TO NEXT PAGE)

[27] G. Other _____
[28] 1) Number of patients: ____
[29] 2) How decide: _____
_____
_____
[30] 3) Look for: _____
_____
_____
[31] H. Other _____
[32] 1) Number of patients: ____
[33] 2) How decide: _____
_____
_____
[34] 3) Look for: _____
_____
_____

(MOVE TO NEXT PAGE)

[35] 5. What regulations or policies, if any, exist in your hospital which limit the use of exercise tests or exercise radionuclide, pre-discharge?
(NOTES)

[53] 5a. (IF LIMITATIONS ARE GIVEN) How, if at all, would your use of such tests be different if these limitations did not exist?

[36] 6. Are there any *other* factors which affect your use of these tests? EXAMPLES: AVAILABILITY, COST, INSURANCE, WAITING TIME, DRGs).

(MOVE TO NEXT PAGE)

[37] 7. Now, Dr. _____, I'd like to ask you to focus on those coronary patients for whom you are planning long term care. What do you do to inform them about conventional coronary risk factors, around the time of discharge or during the first followup visits?

(NOTES)

(RECORD THE FOLLOWING IF VOLUNTEERED)

[38] Smoking _____

[39] Hypertension _____

[40] Hyperlipidemia _____

[41] Stress _____

[42] Other (exercise, weight reduction) _____

[43] 8. How do you follow up on your recommendations?

(MOVE TO NEXT PAGE)

[44] 9. Finally, Dr. _____, what, if anything, would you like to do to enhance education for your patients?

(NOTES)

[45] 10. Dr. _____, thank you for spending this time with me. Do you have any final questions or comments?

Thanks again for your time.

[46] STOP TIME: _____

[47] INTERVWR

[48] MMDDYY

[49] CONTCTS

[50] CANCLLTNS

CHECK NOTES FOR CLARITY AND LEGIBILITY

Code: _____

[51] Procedure for identifying MI patients at high risk for recurrent infarct or sudden death:

[52] Content of counseling for patients with coronary disease:

Appendix F
Post-program Interview Protocol: 1984–85 (attendees)

American College of Cardiology
Interview Protocol
Form B–Post-program Attendees

PERSON INTERVIEWED: _____ SUBJECT CODE: _____
(numeric code)
PHONE #: _____ START TIME: _____
CITY AND STATE: _____
INTERVIEWER: DATE: _____
NUMBER OF CONTACTS REQUIRED BY SECRETARY TO SET UP APPOINTMENTS: _____
NUMBER OF CANCELLED INTERVIEW APPOINTMENTS: _____

Hello Dr. _____. This is Dr. _____ from _____ (YOUR LOCATION). I am a fellow of and represent the American College of Cardiology. This is the second of two interviews done as part of the study on continuing medical education sponsored by the College.

This interview should take about 15 minutes. Your responses will be treated confidentially. A summary of the notes I take will be sent to you for review, along with the notes from the first interview several months ago. I wish to emphasize that this is a study of medical education, not an evaluation of your practice.

This interview in general deals with the rehabilitation of coronary patients who have survived an acute myocardial infarction.

1. First, Dr. _____, I'd like a reading on the number of patients you have recently seen with myocardial infarction. About how many patients with acute MI have you discharged in the past two months?

[4] _____ (IF NONE SEEN, MOVE TO QUESTION 5, PAGE 5.)
(number)

(MOVE TO NEXT PAGE)

2. I'd like you to focus on your current practice with such patients. Before discharge, or within a week or two thereafter, how do you now identify those patients at high risk for recurrent infarct or sudden death?

(FOR EACH TEST, ASK THESE QUESTIONS:
1) About what % of these patients *now* have this test?
2) How do you decide which patients will have the test?
3) What information do you look for from the test?)

[5] A. Exercise test Information volunteered? ___ Yes ___ No
[6] 1) % of patients: _____ (NOTES)
[6.1]
[7] 2) How decide: _____
_____
_____
[8] 3) Look for: _____
_____
_____

[9] B. Exercise radionuclide Information Volunteered? ___ Yes ___ No
[10] 1) % of patients: _____
[10.1] 2) How decide: _____
_____
_____
[12] 3) Look for: _____
_____
_____

[13] C. Cardiac cath/angio Information volunteered? ___ Yes ___ No
[14] 1) % of patients: _____
[14.1]
[15] 2) How decide: _____
_____
_____
[16] 3) Look for: _____
_____
_____

(MOVE TO NEXT PAGE)

(OTHER TESTS USED — RECORD IF VOLUNTEERED)

(NOTES)

[17] D. Resting radionuclide

[20] E. Ambulatory ECG

[23] F. Echo

[23] G. Other (_____)

[36] 3. Which *non-clinical* factors, if any, affect your use of these tests? (EXAMPLES: AVAILABILITY, COST, INSURANCE, WAITING TIME, DRGs).

(MOVE TO NEXT PAGE)

4. I have one more question about exercise tests, exercise radionuclide, and cardiac cath. Is the frequency with which you obtain each of these tests different from what it was in January, or not? (COVER ALL THREE)

(NOTES)

[53] A. Exercise Test SAME MORE LESS
[54] _____

_____

_____

_____

[55] B. Exercise radionuclide SAME MORE LESS
[56] _____

_____

_____

_____

[57] C. Cardiac cath/angio SAME MORE LESS
[58] _____

_____

_____

_____

(IF CHANGE NOTED IN ANY OF ABOVE)
To what do you attribute this change?
[59] _____

_____

_____

_____

(MOVE TO NEXT PAGE)

PAGE 4

5. Now, Dr. _____, I'd like to ask you to focus on those coronary patients for whom you are planning long term care. What do you do to inform them about conventional coronary risk factors, around the time of discharge or during the first followup visits?

(NOTES)

[37] _____

(CHECK SPECIFIC RISK FACTORS MENTIONED)

[38] _____ Smoking
[39] _____ Hypertension
[40] _____ Hyperlipidemia
[41] _____ Stress
[42.1] _____ Exercise
[42.2] _____ Weight reduction
[42.0] _____ Other (Specify) _____

6. How do you follow up on your recommendations?

[43] _____

(MOVE TO NEXT PAGE)

7. What, if anything, would you like to do to *enhance* education for your patients?

(NOTES)

[44] _____

_____

_____

_____

_____

_____

_____

_____

8. Are your methods for informing coronary patients about conventional coronary risk factors different from what they were in January, or not?

___ YES ___ NO —— (MOVE TO NEXT PAGE)

[60] (SPECIFY) _____

[61] _____

_____

_____

_____

_____

(IF CHANGE NOTED ABOVE)
To what do you attribute this change?

[62] _____

_____

_____

_____

_____

(MOVE TO NEXT PAGE)

9. Thank you for your patience, Dr. _____. We're almost done. I have a couple of final questions focusing on the Heart House program itself. Other than those areas we've covered so far, have you made, or will you make, any changes in your practice as a result of attending Dr. Wenger's program in February?

(NOTES)

[63] ___ YES ___ NO

[64] (SPECIFY) _____

10. During this discussion we have focused on your *practice behavior*. In closing, let us please discuss other areas. How, if at all, did the Heart House program affect your *thinking* or *feeling* about rehabilitation of the coronary patient?

[65] _____

(MOVE TO NEXT PAGE)

11. (ASK ONLY IF RESPONSE TO QUESTION 1 IS TEN PATIENTS OR MORE — OTHERWISE MOVE TO QUESTION 12 BELOW.)
Finally, Dr. _____, we have one more request. Our hypothesis in this study is that a telephone conversation between two physicians is a better way of looking at practice than information written on a chart. We are, however, interested in looking at comparisons between the two sources of information for strictly research purposes. If you would allow someone on your staff to respond to a brief questionnaire on the number of patients you've discharged with acute MI and the number of exercise tests ordered for those patients, we would be able to test that hypothesis. The College would be most appreciative, and we will send your staff person $50.00 plus $5.00 per case as partial compensation for the effort. May I have your permission to send the survey to someone on your staff?

[66] ___ YES ___ NO (MOVE TO QUESTION 12)

Thank you. What is the name of the staff person to whom the form should be sent? We will enclose a check for $50.00, then send the rest once we have received the information.

NAME _____

ADDRESS _____

_____

_____

TELEPHONE NUMBER _____

12. Dr. _____, thank you for spending this time with me. Do you have any final questions or comments?

_____

_____

_____

_____

_____

_____

_____

Thanks again for your time.

[46] STOP TIME: _____
[47] INTERWR
[48] MMDDYY
[46] CONTCTS
[50] CANCLLTNS

CHECK NOTES FOR CLARITY AND LEGIBILITY – THEN COMPLETE SUMMARY SHEET

SUMMARY SHEET

Code: _____

Procedure for identifying MI patients at high risk for recurrent infarct or sudden death:

[51]

Content of counseling for patients with coronary disease:

[52]

Appendix G
Post-program Interview Protocol: 1984–85 (controls)

American College of Cardiology
Interview Protocol
Form C–Post-program Controls

PERSON INTERVIEWED: _____ SUBJECT CODE: _____
(numeric code)
PHONE #: _____ START TIME: _____
CITY AND STATE: _____
INTERVIEWER: DATE: _____
NUMBER OF CONTACTS REQUIRED BY SECRETARY TO SET UP APPOINTMENT: _____
NUMBER OF CANCELLED INTERVIEW APPOINTMENTS: _____

Hello Dr. _____. This is Dr. _____ from _____ (YOUR LOCATION). I am a fellow of and represent the American College of Cardiology. This is the second of two interviews done as part of the study on continuing medical education sponsored by the College.

This interview should take about 15 minutes. Your responses will be treated confidentially. A summary of the notes I take will be sent to you for review, along with the notes from the first interview several months ago. I wish to emphasize that this is a study of the medical education, not an evaluation of your practice.

This interview in general deals with the rehabilitation of coronary patients who have survived an acute myocardial infarction.

1. First, Dr. _____, I'd like a reading on the number of patients you have recently seen with myocardial infarction. About how many patients with acute MI have you discharged in the past two months?
_____ (IF NONE SEEN, MOVE TO QUESTION 5, PAGE 5.)
(number)

(MOVE TO NEXT PAGE)

2. I'd like you to focus on your current practice with such patients. Before discharge, or within a week or two thereafter, how do you now identify those patients at high risk for recurrent infarct or sudden death?

(FOR EACH TEST, ASK THESE QUESTIONS:
1) About what % of these patients *now* have this test?
2) How do you decide which patients will have the test?
3) What information do you look for from the test?)

A. Exercise test Information volunteered? ___ Yes ___ No
1) % of patients: _____ (NOTES)
___ (Code)
2) How decide: _____
_____
_____
3) Look for: _____
_____
_____

B. Exercise radionuclide Information Volunteered? ___ Yes ___ No
1) % of patients: _____
___ (Code)
2) How decide: _____
_____
_____
3) Look for: _____
_____
_____

C. Cardiac cath/angio Information volunteered? ___ Yes ___ No
C. % of patients: _____
___ (Code)
2) How decide: _____
_____
_____
3) Look for: _____
_____
_____

(MOVE TO NEXT PAGE)

PAGE 2

(OTHER TESTS USED — RECORD IF VOLUNTEERED)

(NOTES)

D. Resting radionuclide

E. Ambulatory

F. Echo

G. Other (_____)

3. Which *non-clinical* factors, if any, affect your use of these tests? (EXAMPLES: AVAILABILITY, COST, INSURANCE, WAITING TIME, DRGs).

(MOVE TO NEXT PAGE)

4. I have one more question about exercise tests, exercise radionuclide, and cardiac cath. Is the frequency with which you obtain each of these tests different from what it was in January, or not?

A. Exercise Test SAME MORE LESS

B. Exercise radionuclide SAME MORE LESS

C. Cardiac cath/angio SAME MORE LESS

(IF CHANGE NOTED IN ANY OF ABOVE)
To what do you attribute this change?

(MOVE TO NEXT PAGE)

5. Now, Dr. _____, I'd like to ask you to focus on those coronary patients for whom you are planning long term care. What do you do to inform them about conventional coronary risk factors, around the time of discharge or during the first followup visits?

(NOTES)

(RECORD THE FOLLOWING IF VOLUNTEERED)

Smoking _____

Hypertension _____

Hyperlipidemia _____

Stress _____

Other (exercise, weight reduction) _____

6. How do you follow up on your recommendations?

(MOVE TO NEXT PAGE)

7. What, if anything, would you like to do to *enhance* education for your patients?

(NOTES)

8. Are your methods for informing coronary patients about conventional coronary risk factors different from what they were in January, or not?

YES NO (MOVE TO NEXT PAGE)

(SPECIFY) _____

(IF CHANGE NOTED ABOVE)
To what do you attribute this change?

(MOVE TO NEXT PAGE)

9. Dr. _____, thank you for spending this time with me. Do you have any final questions or comments?

_____

_____

_____

_____

_____

_____

_____

_____

Thanks again for your time.

STOP TIME: _____
INTERWR
MMDDYY
CONTCTS
CANCLLTNS

CHECK NOTES FOR CLARITY AND LEGIBILITY – THEN COMPLETE SUMMARY SHEET

SUMMARY SHEET

Code: _____

Procedure for identifying MI patients at high risk for recurrent infarct or sudden death:

Content of counseling for patients with coronary disease:

Appendix H
Case Studies: 1984–85

ATTENDEES: BEHAVIORAL CHANGE

Dr. 1 is chief of cardiology at a 400 bed community hospital. He is salaried by the hospital and has a small private practice. He discharges 4–6 patients per month with acute MI. He uses the exercise stress test to stratify risks in almost all patients, both before and after the course. He would like to make more use of coronary catheterization but that procedure is not available in his hospital. He makes use of a hospital based educational program supplemented by his personal counseling and followup office visits. Lipids get more attention now because of the Heart House course and his own reading. He further believes that his thinking on the rehabilitation of older patients has changed.

Dr. 2 is a full-time cardiologist, hospital based in a multi-specialty group. He discharges 3 acute MI patients each month. Emphasis is placed on initial clinical course. Nearly every patient receives an exercise test unless he/she is submaximal or symptom limited. Exercise radionuclide is not generally done, although a slight increase in exercise radionuclide was reported post Heart House program. He indicates that he does more nuclear tests because of more equivocal treadmills. Dr. 2 has an in-hospital physical therapist who informs patients of risk factors. Dr. 2 also counsels the patient. He follows up personally one week post discharge and checks specific risk factors. Dr. 2 would like to see the hospital establish a full time patient educator to work with patients before and after discharge. Dr. 2 indicates that his methods for informing patients about coronary risk factors have changed. He has become more involved with patients in discussing lipids and in assessing risk factors. He attributes this change directly to his participation in the Heart House program. He also states that his ideas were reinforced by the program and that his attitudes toward hyperlipidemia and post infarct treadmill changed.

Dr. 3 is an internist with an emphasis in cardiology in a four-man group practice, seeing 8–12 acute MI patients per month. He uses exercise stress tests routinely, exercise radionuclide often and cath in about 50%. He uses exercise stress tests earlier after acute MI as result of the course. Dr. 3 uses a hospital and post-hospital 12-week rehab program for all patients. He talks with patients to reinforce risk management. Follow-up is done first by office visits, and then he uses a rehab program with three month visits. He would like to extend the rehab program longer, and to be able to spend more time on dietary intervention. The course strengthened his attitudes toward dietary management and he is now more aggressive about it. He is also considering formation of his own group rehab program.

Dr. 5 is an internist in group practice in a community of 20,000. There is no cardiology backup within the community. He discharges about 4–5 acute MI patients per month. Neither exercise radionuclide nor cardiac cath facilities are available locally; radionuclide facilities are 35 miles away and cath facilities are 10 miles away. Prior to the course he gave an exercise stress test to about half of his patients; now he does it routinely on all and has shared his new approach with his partners. The Heart House course has established, for him,

the value of the exercise test. He utilizes a hospital based education program covering all risk factors and follows up with a community based rehab program, when cholesterol levels are checked. Emphasis on exercise within the hospital based program has been increased as a result of the Heart House course.

Dr. 6 is a full time cardiologist in a hospital based group practice. He discharges about 5–10 MI patients per month. He did not routinely stratify risk factors either before or after the course. In patient education, he utilizes a hospital based program and personal counseling, emphasizing smoking, hypertension, hyperlipidemia, exercise and weight reduction. Post course he places greater emphasis on lipids. He uses office visits for followups. Prior to the course he had no plans for enhancing patient education, after the course he reported he would like to establish a formal rehabilitation program.

Dr. 8 is a solo practitioner in cardiology. He discharges approximately ten acute MI patients per month. All patients receive an exercise test, unless they are debilitated. Post the Heart House program, Dr. 8 reported that patients with equivocal treadmill or lesions demonstrated at catheterization receive exercise radionuclide and that all patients who are able receive an exercise stress test. Patients with consistent pain are referred for catheterization. The cath labs in the area usually require insurance. He considers the insurance issue and DRGs in his decision making and he indicates that he does more stress testing because of a Heart House program in Anaheim. Dr. 8 provides American Hospital Association printed material and personally counsels patients regarding coronary risk factors. Follow-up office visits are scheduled for personal inquiry by the physician. Dr. 8 also indicates that Dr. Castelli's comments on drug treatment of patients with high cholesterol impressed him and that he will pursue this course of action. The Heart House program heightened his awareness of what experts in the field are doing and helped him to start thinking more seriously about implementing a rehab program in his hospital.

Dr. 10 is a full-time cardiologist practicing in a six-man general medicine group. He sees 5–10 acute MI patients per month; he uses exercise stress tests routinely unless patients are debilitated, and cath in about 50%. Since the course he uses exercise stress tests more in an effort to identify patients at risk. Dr. 10 reviews risk factors in conference with a dietitian in the hospital, and also uses nurses with A-V films. Follow-up office tests are routine and he reviews findings with patients. He has no formal rehab program and would like to see one formed for hospital and post-discharge patients, using non M.D. personnel. The course increased the emphasis and intensity he gives to diet treatment, and he uses dietitians more. He feels pessimistic however about the success of rehab, because of the small number of patients entering organized programs.

Dr. 11 is an internist/cardiologist in group practice. He discharges about 3–5 patients per month with acute MI. He uses the exercise stress test routinely (all patients) as the primary means of stratifying risk, both before and after the course. He utilizes a hospital based education program and has personal discussion with his patients. He routinely checks risk factors in followup office visits. He is now more aggressive in his concern for cholesterol and he attributes this to Dr. Castelli's lecture.

Dr. 16 has a solo practice, and is the only internist in a small town. He cares for patients in the town's only hospital, seeing about 5–10 MI patients in a typical month. Methods of stratifying patients at risk involve the use of exercise tests with all patients who are younger than 80, and he then performs cardiac cath for about 20 percent of them. He also uses echo. Nuclear scan is not available, and he practices "defensive medicine" which increases his use of tests. He feels more comfortable than before the course in doing what he is doing. Dr. 16 uses a nurse team to provide literature, show films, and counsel patients. He sees his patients 7–10 days following discharge, then questions them about specific risk factors. As a result of attending Dr. Wenger's program, Dr. 16 treats hypertension patients more aggressively and has improved education for diabetic patients.

Dr. 17 heads the medical department of a large corporation. He, along with other corporate physicians, sees MI patients (about one per month) four to six weeks post infarct. He counsels them on all risk factors, including smoking, hypertension, lipids, stress, and weight control. As a function of the Heart House program, he is more favorably disposed toward risk stratification using exercise stress tests and radionuclide. He is more aware of lipid risk factors as a result of the course, and feels he now takes a more aggressive approach to definitive diagnosis and direct risk management, particularly in younger patients. He was disappointed that the course did not provide more evidence of patients successfully returning to work post-MI.

Dr. 19 is an internist in solo practice with a concentration in cardiology. He sees relatively few patients with acute MI, indicating that he discharges about one per month. He uses two principal means to identify patients at high risk: he is making an exercise test routine, and he also relies heavily on clinical evaluation where he looks for dysrhythms, congestive heart failure, aneurysm, conduction defects, and hypertension. Cardiac cath is used only infrequently and then if a patient is symptomatic or at high risk after infarction. Dr. 19 indicated that he spends a great deal of time himself with patients after the "initial anxiety phase," visiting them once or twice a day along with the spouse. A patient education program is also available from the nurses in the step-down unit. Risk factors covered during these sessions include smoking, hypertension, lipids, exercise, weight reduction, and life style. He follows up on recommendations during regular office visits where appropriate lab tests are done. Dr. 19 is quite satisfied with the success of his patient education effort: he feels that it works well and that he relates closely to his patients. He appreciates the amount of attention cardiac risk factors have received in the public press. His methods for patient education have changed since the course, to place more stress on blood lipids. He attributes this change to the Heart House program. Specifically, Dr. 19 attributes much of what he does differently to Dr. Castelli, who influenced him "profoundly" in his practice. He noted no other specific practice changes, although he is now more enthusiastic and aggressive about rehabilitation, and is planning to establish an exercise program itself. Overall he felt the course was excellent and he would take it again.

Dr. 20 is a cardiologist whose group practice is office-based and in the hospital. Dr. 20 discharges 8 to 10 acute MI patients per month. Before the Heart House program, none of the acute MI patients received exercise stress tests or

radionuclide testing at discharge. After the program, Dr. 20 uses exercise stress, cardiac catheterization and ambulatory ECG to assess risk factors. He indicated that he had more confidence in the prognostic value of stress tests after the Heart House program. Dr. 20 indicated that because of DRGs, testing is delayed, patients are discharged early and the tests are completed approximately 3 weeks post discharge. After the program, he began to increase his use of exercise tests and decrease his reliance on cardiac catheterization. He is less aggressive about CABG. Dr. 20 checks specific risk factors during office visits every three months in follow-up. He has an in-hospital discussion with patients around the time of discharge, provides them with printed material and enrolls them into a formal rehabilitation and lipid modification program. Since attending the Heart House program he has been more aggressive in follow-up on lipid modification, because of the Heart House course and recent literature. He would like to see more dietary expertise and audio-visual materials brought to bear in education of patients.

Dr. 21 is an internist who had been in solo office practice for one month; 30% of his patients have coronary heart disease. He sees 3–5 acute MI patients per month, uses the exercise stress test routinely and cath rarely. Since the course he uses the exercise stress test with more confidence in its value and technique. Dr. 21 uses an in-hospital rehab program for education. Office follow-up includes regular office evaluation, an interview with a dietitian after two weeks, and some would like to use more A-V aids and group sessions. The course has made him more aggressive about cholesterol and more convinced about the value of rehab programs.

Dr. 22 is an instructor at a metropolitan hospital, specializing in cardiac rehabilitation. His primary method of stratifying patients at risk is the exercise test, obtained on all who can perform. He now orders more exercise tests than he did before the program attributing the change to the development of a new rehab program and the course at the Heart House. He informs patients about risk factors using a nurse educator and formal program in the hospital. He follows his patients in the clinic at regular intervals. Dr. 22 would like to have group meetings and planning sessions with a nutritionist present and available for consultation. He also plans an out-patient exercise program. He now has reinforcement and repetition in his program to improve compliance, and attributed the change to the course. Previously Dr. 22 had reservations regarding the benefit of an out-patient exercise program, but after the course felt that such a group program can benefit patients.

Dr. 23 is a full time cardiologist in a four person cardiology group. He does invasive and non-invasive cardiology and his hospital is a referral center for a larger area. Radionuclide facilities are not available. His group discharges about 23 patients per month. Prior to the course somewhat less than half that number would receive an exercise stress test; after the course those receiving an exercise stress test constituted 90–95% of his acute MI patients. He utilizes an in-hospital education program with AHA materials, supplemented by discussion with him. He is more emphatic about lipids now as Dr. Castelli's lecture made a great impression on him. He would like to see better education for primary physicians, better audiovisuals for patients and Medicare payments for rehab programs.

Dr. 24 is in a fellowship program. This is his first year, following a ten-year practice in general internal medicine. The setting of this fellowship is a large, private, multispecialty clinic. When he is on the service of the coronary care unit he discharges between 30–40 patients per month. Exercise tests are performed on all those patients who have had uncomplicated MI's and are candidates for a rehab program. An exercise radionuclide is also performed on those patients who are experiencing angina post infarction. A relatively small number of patients, those with angina at low stress, have a cardiac cath performed on them. Because of his fellowship status, Dr. 24 indicated that his use of these procedures had not changed in frequency pre versus post interview. Dr. 24 discusses risk factors directly with the patient prior to discharge. Also a cardiac rehab program run by nurses is available. In these sessions smoking, hypertension, lipids, exercise, weight, and diabetes where appropriate, are all discussed as specific risk factors. Recommendations are followed up in out-patient visits. Smoking is checked, as is weight, diet, and lipids. There is also a Phase II rehab program which is run by two cardiac rehab specialists. About half of the patients discharged wind up in this program. While Dr. 24 is rather satisfied overall with the nature of patient education at his hospital, he feels that rehab nurses are the key to an effective education program, especially since they are typically those who stimulate physicians to think about risk factor modification. Dr. 24 noted no changes in patient education strategies since the period preceding the program. He did note, however, that he has made a greater personal effort to inform patients about risk factors since the program, particularly lipids, and in general he felt the Heart House program reinforced the practicality and importance of rehabilitation.

Dr. 25 is a clinical cardiologist in a multi-specialty group of 80 physicians. Approximately 80% of his practice is cardiology. He is not an invasive cardiologist. He has discharged about 2 patients each of the last two months. In the pre-program interview Dr. 25 indicated using exercise tests to evaluate potential bypass candidates; in the post interview he indicated their use for all who can exercise, citing "recent liteature" as the major factor behind the change. Patients with subendocardial MI or over age 75 are referred for cardiac catheterization. Dr. 25 indicated that he had attended this same Heart House course two years ago. As a result of attending the most recent one, however, he indicates that his feelings on the benefits of rehabilitation have been solidified. A cardiac rehabilitation team advises patients on risk factors and exercise. Follow-up is done in routine office visits. He checks lipids. He believes his rehabilitation team does a fine job of patient education.

Dr. 26 is a full-time hospital based clinical cardiologist in a two-man group. He sees 10–25 patients with acute MI per month. He uses the exercise stress test (slightly more since the course) and infrequently exercise radionuclide and cath. His increased use of the exercise test stems from both the course and literature. Dr. 26 directly counsels hospital patients about risks, with help from nurse teaching two times a week. Follow-up is done with office counseling and risk measurements. He would like more group education programs for patients and spouses and M.D.-supervised community meetings. Overall, the course reinforced his knowledge about rehab, an area not covered in his training fellowship.

Dr. 27 has a practice consisting mainly of internal medicine with some cardiology. He is in solo practice and uses a community hospital. He discharges approximately two MI patients in a typical month and there are currently no non-clinical factors restricting the availability of any of these tests at his hospital. His primary method of stratifying patients at risk is the exercise test. About 50% of those who have had the exercise test receive cardiac cath if they are less than 55 years of age. He uses the exercise test more frequently, and plans to use exercise radionuclide more frequently. He attributed this change to Dr. Wenger's course. Dr. 27's patients participate in a cardiac teaching program in the hospital. He also uses an outpatient exercise program. He reviews risk factors himself with each patient, and he sees patients in his office 10–14 days following discharge. He checks their compliance through office visits. He is interested in providing more preventive education before the MI occurs. He indicated that he is now more aggressive about informing his patients about conventional risk factors, and in using cholesterol lowering agents. He attributed this change specifically to Dr. Castelli's lecture. He has also become convinced of the benefits of a rehab program since he participated in the Heart House course.

Dr. 29 is an internist in solo practice with an emphasis in cardiology. He discharges approximately four patients with acute MI in a typical month. His methods for stratifying risk for those patients have changed between the first and second interview. In the first interview he indicated that he did not usually do a low level treadmill around the time of discharge, that instead it normally took place 4–6 weeks afterwards. In the second interview, however, he indicated that he does an exercise test around the time of discharge for all patients except those with congestive heart failure, unstable patients, or those with continuing chest pain who are referred for cath. Other tests used both before and after the program include a resting radionuclide, ambulatory EKG, and echo. Dr. 29 indicated that he had increased his use of exercise tests and cardiac cath since the first interview in January and attributed this change to "the trend all over the country," the Heart House course, and reading that he had done. He indicated that he felt more comfortable doing an early exercise test now and that he has less fear of harming the patient. Patient education is done in the hospital with a team of CCU nurses who give patients pamphlets on risk factors plus other formal education. Dr. 29 reinforces this education on follow-up visits. Dietitians also routinely see all patients individually and as a group. Particular risk factors covered include smoking, hypertension, lipids, exercise and diabetes. Dr. 29 checks these risk factors on follow-up visits and also has a six-month rehab program under nurse supervision, consisting of exercise and counseling. He would like to enhance education for his patients by providing them with more reading material and videotapes. He did not indicate any change in his methods of patient education compared to the first interview. Besides increasing the use of exercise tests, he is now initiating cardiac rehab earlier and using a more formal protocol as a result of taking the course. Further, he feels more confident in diagnosing rehab potential post MI and post CABG, and is more aggressive and specific in his treatment of these patients.

Dr. 30 is an internist in a small town without a cardiologist. He has a solo practice. He plans to start and to run a cardiac rehabilitation program in his hospital. He discharged approximately four acute MI patients during each of

the past two months. Exercise stress test is the major method for assessing risk pre-Heart House and post-Heart House program, although he has used it more since the program. Exercise radionuclide is unavailable. He indicates he is doing more stress testing because of what he learned at the Heart House program. If the patient has complications or a positive ETT, they go to cath. Also, because of the Heart House program he has initiated more formal instruction of patients on risk factors. He repeats specific checks during follow-up visits, e.g. repeats cholesterol every 2 months, asks about smoking, emphasizes weight. The Heart House program also has led him to spend more time explaining the importance of diet and cholesterol control. Because of the program, he has initiated a formal instructional course on informing patients of risk factors. Nurses handle most of it. It focuses on diet, salt intake if the patient has HBP or CHF and exercise.

Dr. 32 is a full-time, board certified cardiologist in group practice who will be supervising a new private hospital cardiac rehab program. He sees 4–9 patients per month with acute MI. Before the course he used the exercise test occasionally, and now uses it in virtually all patients. He uses exercise radionuclide and cath only rarely. The course reassured him about the safety of exercise tests and reinforced his opinions about rehab usefulness. He personally counsels patients about risks and uses a dietitian with office follow-up reviews of risks and treatment details. He repeats lipids and sometimes the exercise test. In the hospital he tries to include the family and to use audio-visual aids, books, and brochures. Now 90% of his patients return for the rehab program with eight weeks of education.

Dr. 35 is a full time Navy cardiologist; 50% of his practice is inpatient, 50% outpatient; 10% is internal medicine, 90% is cardiology. He discharges about 10–12 acute MI patients per month. He uses the exercise stress test as the primary means of risk stratification, giving it to about 90% of his patients. Frequency of use did not change between interviews. Dr. 35 utilizes a hospital based education program and personal consultation. All risk factors except stress are covered. He provides follow-up coverage in office visits. Prior to the course, he had not considered any changes in his educational effort, except for smoking. Since the course, he places greater emphasis on dietary and lipid factors and feels that he needs more time and help by office nurses in follow-up education. He is planning to move into civilian practice and there anticipates active use of rehab programs.

Dr. 36 is in a solo practice of internal medicine cardiology and discharges about 17–20 MI patients per month. His primary method of stratifying risk both before and after the course is a Holter monitor which is used on virtually 100% of his patients to assess arrhythmia. Prior to the course he used an exercise test pre-discharge only sparingly for patients with excellent rehab potential. After the course, he increased his use of exercise tests to about 20% of discharged patients, predominantly young patients who have exhibited an early drop in enzymes. Most patients who obtain an exercise test also have an exercise thallium performed to evaluate left ventricular performance. Neither exercise radionuclide nor cardiac cath are available in this hospital. He attributed his increased use of exercise tests to the Heart House course, indicating that he felt more comfortable about the risk involved. Patient education around the time of discharge consists of dietary instruction, help in

stopping smoking, prescription for exercise level and ways to manage stress, all of which is done by the nurses in the hospital and by Dr. 36 himself. Recommendations are followed up at regular office visits 10–12 days post discharge and at 2 and 3 week intervals thereafter, where progress is discussed with the patient and other family members who are encouraged to help the patient deal with identified risk factors. Dr. 36 would like to have more time to devote to patient education, specifically more time for group sessions. He would also like to use videotapes more often. He indicated that his methods for patient education have changed since the course, that he is spending more time now talking about activity and future return to useful work. He attributes this change to the Heart House program. An additional practice change is to use the Holter monitor more often to evaluate anti-arrhythmic therapy. Finally, he was encouraged enough by the course to want to start his own local rehab program.

Dr. 37 is an internist. Three quarters of his practice is in cardiology. He discharges approximately three patients per month. It is a solo practice and is non-invasive. Nearly all of his patients, and about half of those for whom he is a consult, receive an exercise stress test. Almost all have an exercise radionuclide at six weeks post MI. They must be transferred by helicopter to receive catheterizations. He indicated that ignorance on the part of patients and local family practitioners affect his use of tests. A minor number of patients receive catheterization. Dr. 37 follows-up with office visits one week post discharge. He consults with the patient personally. At discharge, nurses and dietitians explain risk factors to the patients. He uses visiting nurses for follow-up. He believes that patients should be educated to risk factors during high school and that patients and family physicians should be educated regarding the need for exercise tests post MI. The Heart House program has reinforced his feelings and practice regarding exercise tests. He is also more firm with patients regarding cholesterol and diet. His feelings about the need for rehabilitation were confirmed by the course.

Dr. 39 is a clinical cardiologist in group practice, seeing ten patients per month with acute MI. He uses exercise stress tests and exercise radionuclide in all and caths in 50%. (He was performing an office treadmill *during* the 1st interview!) Since the course he uses exercise radionuclide much less because he is less confident about the reliability of its images. He uses cath more because he is impressed with results of surgery and cath angioplasty. Dr. 39 uses a ten-factor coronary risk score card himself and with hospital staff. Almost all patients enter a three session rehab program which he runs at his office, and a few go to a YMCA rehab program. Lipid, stress, and exercise risks are regularly evaluated at eight week intervals in his office. He considers himself a leader in the community regarding patient education. Since the course he has become more convinced about lipid management; the course has also made him more sophisticated about the use of exercise stress tests, allowing him to do more for the patient with low cardiac function (ejection fractions).

Dr. 40 is in solo practice seeing both internal medicine and cardiology patients (80% to 20%). Neither exercise radionuclide tests nor cardiac cath are available and patients must be referred for these tests to another hospital. Dr. 40 obtains the exercise test in about seventy-five percent of his patients, espe-

cially those who are very young and returning to work, and who have experienced very severe chest pain. Use of exercise tests has increased, and he attributes this change to greater confidence in the stress test as a safe procedure since attending Dr. Wenger's course. Dr. 40 uses a hospital program to inform patients about their risk factors. He becomes involved himself only through follow-up, by checking what has been accomplished with his patients three weeks after discharge, focusing on hypertension, lipids, and weight reduction. Dr. 40 pays more attention to lipid analysis and follow-up, and he attributes this change partially to the Heart House course. He feels the course was helpful and will help him develop an up-to-date education and practice.

Dr. 41 is a general internist in solo practice in a town of 10,000. He discharges one or two acute MI patients per month. He uses the exercise stress test routinely to stratify risk factors in these patients, and reported using exercise tests more frequently after the Heart House program. Exercise radionuclide facilities are not available. Dr. 41 uses a hospital based education program and personal consultation with his patients. All risk factors are covered in follow-up office visits. Since the course, he places greater emphasis on lipids because of Dr. Castelli's lectures. Before the course he was not sure that a formal cardiac rehab program was applicable to his situation; after the course he noted that he might be interested in a formal exercise program. Additionally, he is now giving more thought to maintaining the functional capacity of elderly post MI patients and he is writing more formal exercise prescriptions.

Dr. 42 is a cardiologist who spends about 80% of his time in private practice and about 20% of his time teaching in a medical school. Dr. 42 discharges about 10 patients per month with acute MI; 80% of them receive an IV streptokinase, and all have a cardiac cath prior to discharge. An exercise test is not usually done until about three months post discharge. In patients with a left ventricular dysfunction (about 10%) a resting radionuclide is also ordered. An exercise radionuclide is generally not done. No change was indicated in the frequency of these tests pre-post program. Dr. 42 directs the rehab program in his hospital, so in addition to personally reviewing risk factors with all of his patients including smoking, hypertension, lipids, exercise, weight reduction and diabetes where appropriate, he also supervises their activity in a three phase rehab program. Dr. 42 follows up his recommendations personally during office visits, and does a lipid profile at three months at the time of the exercise test. Dr. 42 is generally satisfied with patient education, but would like to see risk factor modification emphasized in the early years as a part of a major educational effort. His methods for informing patients about risk factors have changed: he is now more aggressive about diet and cholesterol management, and attributes this change both to Dr. Wenger's course and to the literature. A specific practice change Dr. 42 made as a result of attending Dr. Wenger's program was to increase physical activity of patients prior to discharge and then to watch them on telemetry. In other areas the course served to reinforce his existing beliefs, and he volunteered that he enjoyed the course very much.

Dr. 43 is a full-time cardiologist in a private group practice. During the past two months, he has discharged 20 MI patients. More than half his patients received exercise stress tests. None received exercise radionuclide. It is un-

available. About thirty percent went for catheterization. He explained that he has to wait too long for the thallium studies. To inform his patients of risks, he discusses them with the patient and the spouse. Then a cardiac rehabilitation nurse who works for the hospital explains risk factors to them. Dr. 43 does no follow-up, since he has a consulting practice. Dr. 43 believes that public awareness of risk factors needs to be heightened through newspapers, television and other media. He places more emphasis on cholesterol when counseling his patients because of information he received at the recent Heart House program. He believes he learned something about treadmill testing from the program as well.

Dr. 44 is an internist in a small private hospital-based group practice, seeing 2–8 patients per month with acute MI. This is his first Heart House program. He uses an exercise stress test on most patients and cath occasionally if the stress test is abnormal. He rarely uses exercise radionuclide, but frequently uses resting radionuclide (less and less, apparently because of costs). Since the course he uses exercise stress tests slightly more often to evaluate prognosis and develop exercise prescriptions. Dr. 44 discusses risk factor modification with patients during their hospitalization, and uses dietitians and nurses as well. He follows up with an office interview, including the family if possible; he uses the exercise stress test/Holter at three months post discharge and measures cholesterol. He hopes a new cardiac rehab program will help him with compliance; he would also like to see more group sessions and films. Since the course he has become more aware of treating hyperlipidemia. The course also made him a little more aggressive in exercising patients: he is a little less conservative about activity levels and, if the test is negative, pushes the patient a little harder, since he is more convinced of prognostic value of the exercise stress test.

Dr. 46 is in solo practice with 65% of his practice devoted to internal medicine and 35% to oncology. He discharges about 3–4 acute MI patients in a typical month. He gives the exercise test to almost all of these patients, both before and after the course. He has increased his use of cardiac cath following the course. He provides in-hospital patient education and covers most risk factors. He re-emphasizes risk factors in follow-up office visits. He believes that he now pays greater attention to diet, gets patients mobile earlier and thinks more about the importance of rehabilitation as a result of attending the Wenger course in February.

Dr. 47 is a general internist awaiting hospital privileges, and thus does not discharge acute MI patients. He personally provides post discharge education and covers all risk factors. He gives greater attention to lipids because of his attendance at the Heart House program and plans to make his entire educational program more formal, with greater use of audiovisual aids and to emphasize aerobic exercise.

Dr. 49 is a general internist in a community of 15,000–20,000 people. He discharges 1 to 2 patients per month following acute MI. He has no facilities available for exercise stress tests, radionuclide, or cardiac catheterization. He counsels patients on risk factors and uses in-hospital film strips. These materials are shown by nurses. He follows up during office visits and checks specific risk factors. He indicates that he knows more about risk factors and now

relates this information to patients as a result of the Heart House program. He indicates further that his hospital will be getting an exercise testing program and equipment in part because of what he learned at the Heart House program. Further, Dr. 49 said that as a result of attending the course, he believes that a structured rehab program is a reasonable approach and that he feels better about it now.

Dr. 50 is a family practitioner in group practice with a treadmill in his office. He rarely admits acute MI patients, but believes that all should have an exercise stress test, and rarely cath. There were no changes since the course. Dr. 50 uses the in-hospital education service and group sessions. He does office follow-up with his own counseling, and does a 6 week post discharge exercise stress test. He would like more audiovisual programs. Since the course he places more emphasis on cholesterol. He also learned from the course that these patients can often resume high levels of activity.

Dr. 52 is in group practice, with 70% of his practice in cardiology and 30% in internal medicine. He discharges 10-12 acute MI patients each month. The exercise stress test is his prime means for risk stratification, used on about 85% of his patients. There was no change between interviews. Dr. 52 utilizes a hospital based education program and personal consultation; all risk factors are covered. He provides personal follow-up. He had been thinking about hiring a paramedical person to strengthen his education efforts; following the Heart House course he mentioned dietary modification and possibly exercise rehab as educational thrusts to be emphasized by this potential new staff person. Additionally, the Heart House program has stimulated him to think of trying to set up a high risk cardiology clinic and generally made him more aggressive with respect to diet and lipid control.

Dr. 56 is a full time cardiologist whose group practice is primarily hospital based. He discharges about 15-20 acute MI patients per month. Prior to the course he used the exercise stress test for about 25% of his patients and cardiac cath for about 20%. Following the course, he now uses the exercise stress test for about 50% of his patients and about 30% get cath. He attributes the change in the use of the exercise test to Wenger's course which showed it was acceptable to start exercise and rehab programs early. He has used a hospital based phase I program for patient education and has not been involved himself except in office visit follow-up. Following the course he has become more involved with patient group sessions. He believes the diet and lipid modification results presented at the Wenger course are impressive, although he retains some skepticism.

Dr. 59 is a full time non-invasive cardiologist in a five person group practice that uses 3 hospitals. He discharges five acute MI patients per month. Thallium studies are not done in his hospital. About one-third of his patients get an exercise test. He does not use exercise tests to stratify risk in patients with low ejection fraction. All patients get an ambulatory ECG if they have major ventricular arrhythmia. More patients get an exercise test since he has participted in the Heart House program. Patients are given an overview of risk factors according to age and other signs. Office dietitian consults with them. Dr. 59 follows up with lipids and an evaluation of the exercise program of each patient. He refers more patients to the rehabilitation program in hospital

and post-discharge than he did before the Heart House program. He believes that more patients with low ejection fractions, post CABG and those without heart disease are good candidates for exercise rehabilitation. He was more passive in this notion before the program and also in dietary management. As a result of attending the program, Dr. 59 now has an office dietitian 2 times a week to counsel patients. He is referring more patients to the rehab program and is doing fewer radionuclide studies.

ATTENDEES: NO BEHAVIORAL CHANGE

Dr. 7 is director of the coronary care unit, step-down unit, and non-invasive laboratory in a 400 bed hospital. He is employeed full-time by the hospital and also has a part-time teaching appointment at a medical school. As a function of his position he sees and discharges an unusually large number of MI patients, sometimes as many as 150 per month. He does not use an exercise stress test at all. He uses a modified, low-level walk in the hallway and up and down stairs with analysis of pulse response instead. He also uses a Holter monitor on a majority of patients. Those with persistent or recurrent pain, or those with arrhythmias after leaving the CCU, go directly to cath. He uses echo in those patients with complicating problems. Following the course, Dr. 7 indicated that he will do a formal exercise test if requested by the patient or the referring physician (10–15% of the caseload). He feels that the exercise lab would be overloaded if all patients got tests. Dr. 7 administers the hospital rehab program; the team consists of a nurse, dietitian, and rehab technician. Most patients enter the formal rehab program upon discharge. All patients are followed after discharge by their own physician as well as by Dr. 7 and the rehab nurse. Follow-up visits consist of detailed interviews which focus on specific risk factors. There is also a weekly meeting with MI patients as a group. Dr. 7 feels that his present program is a good one, although he is contemplating a Phase II in-hospital rehab program in addition to the present Phase III out-patient program. Patient education methods did not change, pre-post program. As a result of the Heart House program Dr. 7 is considering doing more low level exercise tests to see if they help sort out patients needing early cath. He is not yet convinced, however, about the need for very strict dietary restrictions. Overall, he felt that the course was a good review and that it brought him up to date.

Dr. 12 is a 3rd year resident in family medicine who does not discharge patients with acute MI. He does provide education to post MI patients, emphasizing smoking, weight reduction, hypertension, and hyperlipidemia. Recommendations are followed up in the family practice clinic, where BP, weight, and lipids are checked. Patient education strategies did not change pre-post course, although Dr. 12 did note that he gained much information from the course, especially formulas for calculating LDL cholesterol.

Dr. 13 is an internist and nephrologist in a group practice who sees a great deal of coronary disease in patients with renal disease. He also has a preventive medicine and risk factor prevention program and attended the course to learn more about he role of exercise. He sees about one MI patient per month. Anyone who is a candidate for rehabilitation gets a treadmill EKG, or MUGA exercise test if they can pedal the bike better than walk. Patients who have persistent symptoms or are not doing well on medical treatment go di-

rectly to cardiac cath. All tests are done under the advice of a consulting cardiologist and their frequency did not change pre-post program. Dr. 13 educates patients by visiting with them himself; he also has a dietitian to work with them individually. He specifically focuses on smoking cessation, hypertension, diet and weight control, and control of diabetes, and exercise. Patients are followed up regularly by checking blood pressure, weight, HDL and total cholesterol, triglycerides, and smoking (although he indicated he has not had much success in this last area). His patient education methods did not change since the first interview; in general the program served to reinforce his present practice of intervention. Dr. 13 volunteered that he enjoyed the course very much, although he felt that after the first day and a half there was some repetition in the lectures.

Dr. 14 is a general internist. He participates in a group practice and uses the local community hospital for in-patient care. Dr. 14 discharges about 3 MI patients per month. All of the MI patients receive an exercise stress test, unless they have already had a catheterization or they are elderly. None of the patients receive exercise radionuclide. Those with continued chest pain receive a cardiac catheterization. He indicates no non-clinical factors affecting his decisionmaking, and his approach to risk stratification before and after the Heart House program is the same. Dr. 14 counsels patients regarding risk factors, offers pamphlets, and has an office nurse go over details of diet with patients. His follow-up involves office visits that include checks of specific risk factors. A patient education program is available in the hospital. As a result of attending the Heart House program, Dr. 14 would like to see a more formal group session program established to enhance the education and rehabilitation of patients. He also reports that his appreciation of cholesterol level significance has been heightened.

Dr. 15 is in a community hospital based, mostly consultative practice of osteopathy with 80% cardiology and 20% general internal medicine. He sees 9–12 acute MI patients per month, uses the exercise stress test in most and cath very rarely. There were no changes since the course. Dr. 15 talks with patients in the hospital and uses a nursing education program there with tapes and films. He also uses a hospital rehab program which has only recently begun. Follow-up includes measurement of cholesterol, BP, and smoking with counseling. He would like a more formalized structure to the hospital I rehab program. The course has made him examine exercise radionuclide studies more; he now also thinks that rehab patients need more emphasis on diet.

Dr. 18 is cardiologist in a group practice affiliated with a medical school. Dr. 18 discharges approximately 15 MI patients per month. About 80% of these patients have an exercise test. Essentially the test is routine, unless the patient has difficulty walking or exercising at all. About one patient in five also has a cardiac cath: these are patients who are not doing well, who have persistent angina, or low left ventricular output. These also tend to be patients under 45 and those for whom tests may not have indicated a clear prognosis. A few patients have exercise radionuclide; Dr. 18 does not feel that it is particularly helpful, however, as it has poor correlation with cardiac cath. About 80% of patients have an ambulatory EKG 10–14 days post MI and almost 100% of his patients have a 2-D echo, noting that this is a teaching

setting and so "everybody wants it." If left to himself to order, only about two-thirds would get the echo study, and these to assess left ventricular function. Frequency of use of exercise tests, nuclide and cardiac cath, remained the same pre versus post interview. Dr. 18 has a comprehensive patient education program, beginning with education in the hospital by an office staff member. Finally, Dr. 18 meets with the patient and the patient's family to discuss and stress individual risk factors, including smoking, hypertension, lipids, stress, and weight reduction. Recommendations are followed up in office visits with Dr. 18. The patient's spouse is involved in these visits as much as possible and there are constant reminders about the patient's individual risk factors and their seriousness. Dr. 18 would like to enhance patient education with some specific audiovisual programs on risk factors that would cover not only the general risk but also specific areas such as smoking, cholesterol, and weight control. These tapes would provide a basis for discussion later with the physician. Second, he would like to see a nurse practitioner or clinician in the practice assigned responsibility for informing patients about risk factors. Third, he would like to use a computer terminal to assess patient understanding of risk factors. Dr. 18's methods of patient education did not change after the program, and did not note any behavioral or attitudinal change as a function of the program. He did say that he would like to have had copies of all papers referenced by the course instructors.

Dr. 28 is a full time cardiologist in group practice at a community hospital, discharging about 20–25 acute MI patients per month. His principal means of stratifying risk is the stress test, with smaller numbers receiving cardiac cath. He is limited in his hospital practice by the waiting times for use of the stress test and the radionuclide equipment. He uses a hospital based education program that generally covers all risk factors. Pre course he reported follow-up office visits at 4 months and biennially thereafter to review risk factors. He now would like to start a rehab program in his group, and because of the course is more convinced of dietary factors as risks.

Dr. 51 is a university based rehab medicine physician with an emphasis on cardiology. He discharges no MI patients, thus his responsibility begins with the rehabilitation process after discharge. Education occurs through a well-established pre-discharge class with patients and their spouses, done by dietitians and nurses. All risk factors, including stress and Type A behavior modification, are included in these sessions. Dr. 51 sees the "problem cases" in the rehab program, where he reviews and checks risk factors and personally counsels patients. Methods did not change pre-post program, although Dr. 51 did say that he may now approach the "intellectual" patient differently regarding Type A behavior and stress modification. He would like to enhance his program with more computer-assisted learning.

Dr. 53 is an internist in solo practice who was trained in gastroenterology. He discharges about one patient per month with acute MI, but since his practice is in a rural setting, exercise tests, radionuclides and cardiac cath are all unavailable to him. Instead he tends to stratify risks among MI patients using the patient's clinical course and a standard EKG. While the Holter monitor is available he has not used it. Dr. 53 does a patient education himself around the time of discharge, although a hospital program for patient education has just begun. In his discussions with patients he covers smoking, hypertension,

lipids, exercise and weight control. Dr. 53 follows up recommendations at each office visit. He would like to enhance education for his patients by using the new hospital teaching program, and is interested in the possible future development of an exercise testing program. He did not say, however, that methods for patient education has changed from what they were prior to the Wenger course. Since a rehab program is not yet available in this area, he noted few specific practice changes as a result of attending the course in February, but he did indicate that he intends to use the rehab program when it becomes available. He indicated that he was enthusiastic about rehab prior to the course, and is more so now.

Dr. 54 is an internist with an interest in gastroenterology and cardiology. He is Director of Internal Medicine at a community hospital and he is in solo practice. He discharges about four patients per month who had been seen for acute MI. All his patients receive ambulatory ECG. He indicates that he uses Holter very freely because he finds it useful in all patients. He refers all patients who need stress test, radionuclide, or catheterization. A nursing team shows a movie on risk factors and informs patients of risk factors. In follow-up visits, he checks weight and serum cholesterol. He would like to see pediatricians involved in teaching children about diet and he has been pleased to see a group session with nurses at night for counseling patients on risk factors. Dr. 54 reports no change in his methods for informing coronary patients about conventional risk factors, although he found Dr. Castelli's presentations to be impressive and helpful. Dr. 54 indicates that a rehabilitation program will be especially difficult to start in his area because it is not reimbursed. He believes the value of rehabilitation is good, even though it emphasizes exercise, because it stresses other factors.

Dr. 55 practices cardiology with some internal medicine in a group practice, seeing from 2–10 patients per month with acute MI. He used the exercise test occasionally before the course, and now uses it in most who can perform it. He uses exercise radionuclide and cath less than before the course: he has found data from the former not reliable, and there are now more strict criteria for cath. Dr. 55 is heavily involved in patient education, both in the hospital and later in the office: he explains pathophysiology, symptoms and emphasizes risk factors. A hospital cardiac teaching program is also used. There were no differences in patient education methods between interviews. He would like to have more time with the patient to insure compliance, and he would like to use more printed material. Dr. 55 noted that he was always a strong proponent of rehabilitation and was not changed by the program: it simply reinforced his prior thinking.

Dr. 57 is a full-time hospital based cardiologist and director of his community hospital's division of cardiology. He discharges 3–4 acute MI patients each month. Exercise radionuclide equipment is not available to him and cardiac cath procedures must be done at a nearby university hospital. The exercise stress test is the primary means of risk stratification. Dr. 57 uses a hospital based patient education program, covering all risk factors, for patients and spouses. Follow-up is by means of a coronary club and individual physician visits. Dr. 57 would like to increase his efforts in smoking reduction and weight control. No change in practice behavior was reported between the two interviews, but he plans to develop a more organized exercise rehab program based on the Heart House course.

Dr. 58 is a family physician in solo practice. He has an out-patient practice only, does not admit patients to the hospital, and thus has nothing to do with hospitalized MI patients or risk stratification prior to discharge. After discharge, however, he reviews risk factors with each patient in his office, measures serum cholesterol at the first visit and emphasizes cholesterol management. He has a treadmill in his office and gives exercise prescriptions based upon an exercise test. He also uses nicorettes for smokers. Other risk factors dealt with during these patient education sessions are hypertension, exercise, and weight reduction. He uses a special flow sheet to insure that all of the risk factors are covered at each visit. These methods did not change as a function of the course; rather he felt the course simply reinforced what he is already doing. He enjoyed the program and thought it was worthwhile.

CONTROLS: BEHAVIORAL CHANGE

Dr. 70 is a full-time board certified cardiologist in group practice with four other certified cardiologists, based in a community hospital with a university hospital affiliation. He sees 8–10 acute MI patients per month. In the pre-program interview he indicated using exercise stress tests in all, exercise radionuclide in half and cath in 50–75% of patients. In the post interview he indicated using these tests less often, relying more upon ambulatory ECG. He discusses diet, weight, smoking, exercise, and stress with patients and family, and patients receive some education through a hospital rehab program. His follow-up includes patient interviews in office, where he repeats lipid measurements. He would like to have an RN or LPN for office education, counseling patients and spouses, and would like to use more written information.

Dr. 73 is an internist in group practice. He did not take care of acute cardiology patients at the time of the first interview, but discharged two MI patients between the course and the second interview. Risk stratification strategies include an exercise test for all who can ambulate, exercise radionuclide for those with CHF or recurrence of symptoms, and cardiac cath for those with a positive stress test. He feels that the national trend is to do more cardiac cath, and this is reflected in his practice. Dr. 73 personally discusses risk factors with patients, complemented by printed information, inservice education by hospital nursing staff, and a rehab program, and focuses on smoking, hypertension, and lipids. Recommendations are followed up by checking risk factors during routine office visits. These methods did not change between interviews.

Dr. 77 is a second year resident in a community hospital, internal medicine residency. When he is on CCU rotation (1 month/year) he sees and shares management with primary care physicians on many patients (60/month). He uses an exercise stress test frequently for risk evaluation and cath infrequently. He does not have primary responsibility for clinical decisions. He indicated using an exercise stress test more in the post interview because he "wants to know more." Education often given by the primary M.D. The hospital rehab program is not used routinely. He would like to see a group educator used for all acute MI patients. Over time he has become more convinced of the need to reinforce advice to stop smoking.

Dr. 89 is an internist who practices in a group and does some cardiology. He sees only a few patients with MI; he uses an exercise test (and occasionally cath) to evaluate risk. He is using exercise test and cath more frequently because of literature and availability of cath angioplasty. Dr. 89 uses an in-hospital rehabilitation program and dietitian for education; they stress smoking cessation, treat HBP, check lipids and treat with diet. Dr. 89 sees all MI patients 2 weeks post discharge for follow-up and has some patients in an outpatient rehab program. There were no differences in patient education between interviews. Dr. 89 would like to spend more time with patients and have an in-office nurse educator.

Dr. 92 is a family practitioner with a special interest in cardiology. He helped establish the CCU in his local hospital and has CCU privileges. He is in a group practice and discharges 2–3 MI patients per month. He now routinely uses the exercise test for risk stratification, indicating an increase since the first interview, and attributing the change to literature and lectures. Radionuclide facilities are not available. Dr. 92 supplements a hospital based education program with his own discussion with patients in hospital and follow-up visits, when he covers risk factors. He indicated in the post interview that he pays more attention to cholesterol, and attributed this change to reading and attending lectures.

CONTROLS: NO BEHAVIORAL CHANGE

Dr. 71 is an office-based cardiologist practicing with a group consisting of 45 people in a multi-specialty practice. He uses exercise tests for approximately eighty percent of his patients. Exercise radionuclides are not available in his practice. He uses cardiac catheterization when there is an abnormal exercise result and looks for indications for surgery. Dr. 71 mentioned that the frequency with which he uses these tests did not change, pre-post interview. His general methods of patient education include a rehabilitation program involving nurses and dietitians, and he counsels patients on various risk factors. He would like to extend the program beyond 12 weeks, but feels that the cost would be prohibitive.

Dr. 76 is an internist with emphasis in vascular medicine. Twenty to thirty percent of his practice is in cardiology. He is in a group practice and sees patients at a university hospital or university-affiliated hospital. Nearly all his patients are stress-tested, except those with CHF or persistent angina. He looks for poor exercise capacity raising the question of extensive disease. None receive exercise radionuclide and a few are referred for cardiac-catheterization, those with persistent chest pain. He is limited by an inopportune schedule for thallium studies. All of his patients have a 24 hour ambulatory ECG looking for arrhythmias. No non-clinical factors affect his decision making. A cardiac nurse clinician sees all patients at discharge to instruct them on risk factors. He concentrates personally on informing them of smoking risks, lipids and drugs, if needed. He talks to them about stress. He follows up with blood lipids at regular intervals in his office. He would like to be able to change patients habits more than he thinks he does now. He has a formal exercise program available. About one-third of his patients participate. Dr. 76 reports no change in his behavior, knowledge or attitude pre or post program.

Dr. 78 is an endocrinologist who discharges approximately six patients with acute myocardial infarction in a typical month. The test used most often to stratify risk is the exercise test. Less often, he uses exercise radionuclide and cardiac cath. Use of these tests did not change between interviews. Dr. 78 has a five-day program of inpatient instruction by hospital nurses and classes with nutritionists, emphasizing exercise, weight reduction, smoking, hypertension, and lipid control. He follows up on his recommendations by using a checklist in his office to remind him to review personally with patients how they are following through on the counseling they received in the hospital. Dr. 78 would like to have more time to spend counseling patients on a one-to-one basis. He would also like to have more group education sessions, as well as a post-MI rehabilitation program.

Dr. 79 is a full time cardiologist in group practice and director of cardiac rehabilitation at his community hospital. He discharges about 12 acute MI patients per month. He routinely uses the exercise stress test for all but elderly patients and follows this up in 4–6 weeks with cardiac cath. All MI patients enter a phase I rehab program prior to discharge and those within a 60 mile radius of the hospital enter a phase II program post discharge. He made no changes between interviews.

Dr. 80 is a family doctor in solo practice in a town of about 20,000. He discharges about 2 patients a month with acute MI. He normally stratifies risk for these patients by looking at their general clinical course including the frequency of heart attacks and their severity, the number of previous episodes, and concommitant factors of the hypertension and other risk factors including family history. Exercise tests and nuclear cardiology are not available in this hospital, but he will usually consider an exercise test 4–6 weeks after discharge for patients under 50 years old. He obtains a cardiac cath only rarely and then if the patient might benefit from surgery. His use of these procedures has not changed pre-post program. Prior to discharge, patients are instructed by nurses and dietitians who cover smoking, hypertension, diet, stress, and exercise in moderation. Dr. 80 follows up on recommendations through routine office visits where risk factors are reviewed, patient's blood is checked, strategies are developed for heavy smokers, and work-related stress is reviewed. If there are stress related problems he uses tranquilizers and antidepressants as necessary. Dr. 80 doesn't believe he can do much more to enhance education for his patients. Methods for informing coronary patients about risk factors did not change, pre-post interview.

Dr. 82 is a cardiologist in solo practice. He practices in a community of 70,000. He is 30 miles away from the university hospital. He is on the clinical faculty. He discharges about 8 acute MI patients per month and indicates no changes in his behavior and no non-clinical factors affecting it. He indicates that 60% of his patients get exercise tests, those under 70 years of age and who are doing well. Patients with poor exercise tests are referred for cardiac catheterization. At discharge the physician counsels the patient and family about risk factors, smoking, hypertension, lipids, stress and exercise. There is a rehabilitation program. He uses Phase III exercise program as well as nurses who have an instructional program for patients. To follow up, Dr. 82 sees patients three weeks after discharge, then monthly and involves various pa-

tient groups as well. During the return visits, Dr. 82 reinforces initial recommendations, repeats cholesterol testing and follows blood pressure. Dr. 82 believes more education is needed for patients regarding warning signs for acute MI. His methods for informing patients of risk factors has not changed. He relies heavily on his own personal instruction of patients.

Dr. 84 is in full-time cardiology solo practice and is co-director of a non-invasive and cath lab at a community (private) hospital. He discharges about 10 MI patients per month; he uses an exercise stress test occasionally and cath frequently to stratify risk. Dr. 84 manages patient education using a patient educator along with highly trained hospital nurses. He also runs videotapes in his office. Follow-up is done in the office by him or a nurse; lipids, BP, weight measurements are taken, and a progress review of smoking, HBP, lipid problem, weight reduction is done. Dr. 84 would like to enhance education with better patient compliance and more contact with non-M.D. professionals, e.g., dietitians or trained laypersons. Dr. 84 showed no changes in practice patterns between interviews.

Dr. 85 is a general internist who spends about sixty percent of his time practicing cardiology. His setting is a community hospital where four members, all internists, practice in a group. He discharges about 10–15 patients with acute myocardial infarction in a typical month. He performs exercise tests on all patients routinely, twenty-four hours prior to discharge. He does exercise radionuclide in about one-quarter of his patients and looks for abnormal low level stress tests. About eighty percent of his patients receive cardiac cath, if there is recurrent pain in the first twenty-four to forty-eight hours after the MI. He also uses ambulatory ECG routinely twenty-four hours prior to discharge. There was no change between interviews. His methods of patient education involve dietary consults in the hospital on cholesterol, weight reduction and diabetes, and counseling patients about their smoking habits. A stress management program and visual aids are available in the hospital. He checks risk factors when patients see him in the office during routine office visits, and questions them about their compliance. He is overall very satisfied with his patient education program, and did not indicate any change in his methods of informing coronary patients about conventional risks.

Dr. 86 recently completed a fellowship in cardiology and opened his solo practice in that specialty about 3½ months prior to the first interview. He now discharges 2–3 acute MI patients each month. He uses the exercise stress test routinely for risk stratification and made no changes between the two interviews. He supplements a hospital based risk factor education program (smoking, exercise, diet) with his own discussion with patients both in the hospital and during follow-up visits. He would like to develop a community based phase III cardiac rehab program. He has made no changes in his educational efforts.

Dr. 87 is a full-time cardiologist who acts primarily as a consultant, and operates within a group practice with six other cardiologists. The total group sees about 35 patients per month and of this group Dr. 87 discharges about seven. Dr. 87 typically uses clinical evaluation to stratify risk for these patients. Those with persistent symptoms or with small MI's go directly to cath. He and the other cardiologists in his group mostly see the unstable MI patients.

He does not use exercise tests early but does do them on most patients at 4–6 weeks. He uses a Holter monitor for patients with arrhythmia and echo and/or resting radionuclide for large MI's. He and the other physicians in his practice do not use the exercise radionuclide, at least with the acute MI patient. Dr. 87 indicated that nonclinical factors play a dominant role in the use of these tests. He said that the hospital administration is pushing hard to save money, that DRG's do not exert pressure for rapid discharge. He noted further that physicians often will bypass non-invasive studies in favor of cardiac cath since cath will eventually be needed anyway. Dr. 87's use of risk stratification methods did not change between interviews. MI patients receive intensive counseling in the hospital prior to their discharge, when they are instructed by their cardiologist and a formal teaching program run by the hospital in-service education department. A cardiac rehab program is available, run by a nurse practitioner on an out-patient basis. Patients also receive diet instructions by the hospital dietitian. All risk factors including smoking, hypertension, lipids, stress, exercise and weight reduction are covered in these sessions. Following discharge, patients are followed up by their own personal physician. Dr. 87 sees them only if referred. There is also follow-up available through the rehab service and about 10–15% of patients end up in a patient rehab program. Dr. 87 would like to see two enhancements for patient education: more direct contact as out-patients by their own personal physician to enhance and reinforce risk factor modification, and more formal programs to educate the public so that patients will demand better primary education from their physicians.

Dr. 88 is Chief of Cardiology at a community hospital, a full-time cardiac consultant, and is an employee of the hospital. He sees several private patients. He discharges 6–10 acute MI patients each month. Exercise radionuclide equipment was not available before the program. It was available after the program and 10% of his patients received it. The major method for assessing cardiac risk before and after the Heart House program was exercise stress testing. No non-clinical factors affect decisionmaking. Approximately 75% of the patients receive an exercise test before discharge. Ten percent have an exercise thallium, if the regular stress is equivocal or bundle branch block is present in ECG. Ten to twenty percent are referred to cardiac catheterization, e.g., all patients receiving streptokinase acutely have a cath. Ten to fifteen percent have an echo looking for aneurysm or clot.

Dr. 93 is a consulting cardiologist in a university affiliated group practice with 2 other cardiologists. He discharges about 12 patients with acute MI in an average month. Prior to discharge about two-thirds of these patients go to cardiac cath. These are mostly younger, active patients with good motivation. The rest who are ambulatory have a low level stress test and these are predominantly those with an infverior or subendocardial MI. He also uses clinical course and the presence of congestive heart failure as a factor in helping to stratify risk. He uses exercise radionuclide only rarely, when there is an equivocal stress test or a normal stress test with atypical chest pain. He uses the cost of these procedures as a secondary or tertiary factor in making clinical decisions. Frequency of use of these tests did not change between the two interviews. A cardiac team sees each patient prior to discharge. This team consists of a social worker, physical therapist, dietitian, and cardiac nurse. The team is directed by the cardiac nurse who uses materials such as video-

tapes and pamphlets to teach all risk factors to patients. Of these risk factors the need for exercise is emphasized the most. Patients are followed up after discharge by office visits with Dr. 93 at which time risk factors are reviewed. There is also a follow-up educational clinic available which meets weekly free of charge for one year after the infarct, involving the patient's spouse as much as possible. These methods did not change pre-post program. Dr. 93 doesn't feel that much else is needed in the way of education for his patients, although he did mention that he would like to have additional personnel to help him with follow-up.

Dr. 95 is a full-time invasive cardiologist. There are 14 internists in his group plus 2 cardiologists. Before the program almost none of his patients received exercise stress tests at or around the time of discharge. He either advises coronary angiography, or stress test is done at 3 weeks, before the patient enters a rehab program. He indicated some of the decisions regarding testing are controlled by the referring internist. Patients discuss coronary risk factors at discharge with another physician, a rehabilitation nurse, dietitian and physical therapist. All this is reinforced by an outpatient rehabilitation program. Most patients are referred back to their M.D.'s for follow-up. Dr. 95 believes that more outpatient family-oriented meetings are necessary and this function is being developed by the rehabilitation program.

Dr. 96 is a clinical cardiologist in solo practice, seeing 80% cardiology patients; others are general internal medicine patients with cardiology problems. He sees 5–9 acute MI patients per month, and uses exercise stress tests, exercise radionuclide and cath equally frequently (about 50%). He does exercise tests 4–5 weeks post-infarction. There were no changes between interviews. Dr. 96 uses a hospital dietitian to supplement his own inpatient counsel regarding risks. Follow-up occurs at two and four weeks post discharge with him and his nurse to check compliance. Dr. 96 would like to have more rehab programs available.

Appendix I

Chart Survey: 1984–85

RETURN TO: ACC Project Director
CEDR, Room 129
812 W. Franklin St.
Richmond, VA 23284-0001

AMERICAN COLLEGE OF CARDIOLOGY

Chart Summary for Dr. _____

Please complete each of the following questions. To provide the appropriate information, it will be necessary to review patient charts of the physician noted above.

1. List the patients with acute myocardial infarction discharged by this physician from December 1, 1984 through January 31, 1985. Use a convenient three-digit code, such as the first two letters of the first name and first letter of the last name, to record the list. Then *underline* each patient who received an exercise test prior to discharge or within two weeks thereafter. (Example: "Frank Sullivan" was a MI patient discharged during this period, and received an exercise test. The code would appear as *FRS*. "James Bell" was discharged during this period but did not receive an exercise test. That code would appear as JAB).
2. List the patients with acute myocardial infarction discharged by this physician from _____ through _____, 1985. Use the same criteria as for Question 1. Underline each patient who received an exercise test prior to or within two weeks after discharge.

Please return this questionnaire in the enclosed stamped envelope with your responses to the questions on page 2. If you have questions about it, please contact Dr. Jon Wergin at (804) 257-1121.

(TO BE COMPLETED AFTER FIRST PAGE IS FINISHED)

1. Briefly describe how you retrieved patient charts to find the requested information.

2. What problems did you encounter in conducting the search?

3. How accurate do you feel these data are: that is, how likely is it that exercise tests were done on some patients but not recorded?

4. Other comments or suggestions?